

**BULGA SURFACE OPERATIONS
EASTERN EMPLACEMENT
AREA MODIFICATION**

Statement of Environmental Effects

FINAL

July 2016

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FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Bulga Coal Management Pty Ltd

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1.0 Introduction

The Bulga Coal Complex (BCC) is an open cut and underground coal mining operation located approximately 12 kilometres south west of Singleton in the Hunter Valley, NSW (refer to **Figure 1.1**). Bulga Coal Management Pty Ltd (BCM) operates the BCC on behalf of the Bulga Joint Venture, with mining operations occurring at the site for over 30 years. The BCC consists of two coal mining operations: the open cut operations (Bulga Surface Operations) and the underground operations (Bulga Underground Operations) using shared coal washing and rail loading infrastructure.

On 1 December 2014 BCM was granted approval for the Bulga Optimisation Project (SSD 4960), which related to ongoing operation of the Bulga Surface Operations until 31 December 2035. The approval was granted by the Planning and Assessment Commission (under delegation from the Minister for Planning). The underground operations at the BCC operate under a separate development consent (DA 376-8-2003) granted in 2004 (Bulga Underground Consent).

BCM has identified significant operational benefits in modifying the design of the approved Eastern Emplacement Area (EEA) at the Bulga Surface Operation and the need to modify the approved tailings emplacement strategy for the BCC. To allow for these changes, BCM is seeking to modify the Bulga Surface Operations development consent (SSD 4960) to authorise the implementation of the revised design of the EEA and revised tailings emplacement strategy.

1.1 Background

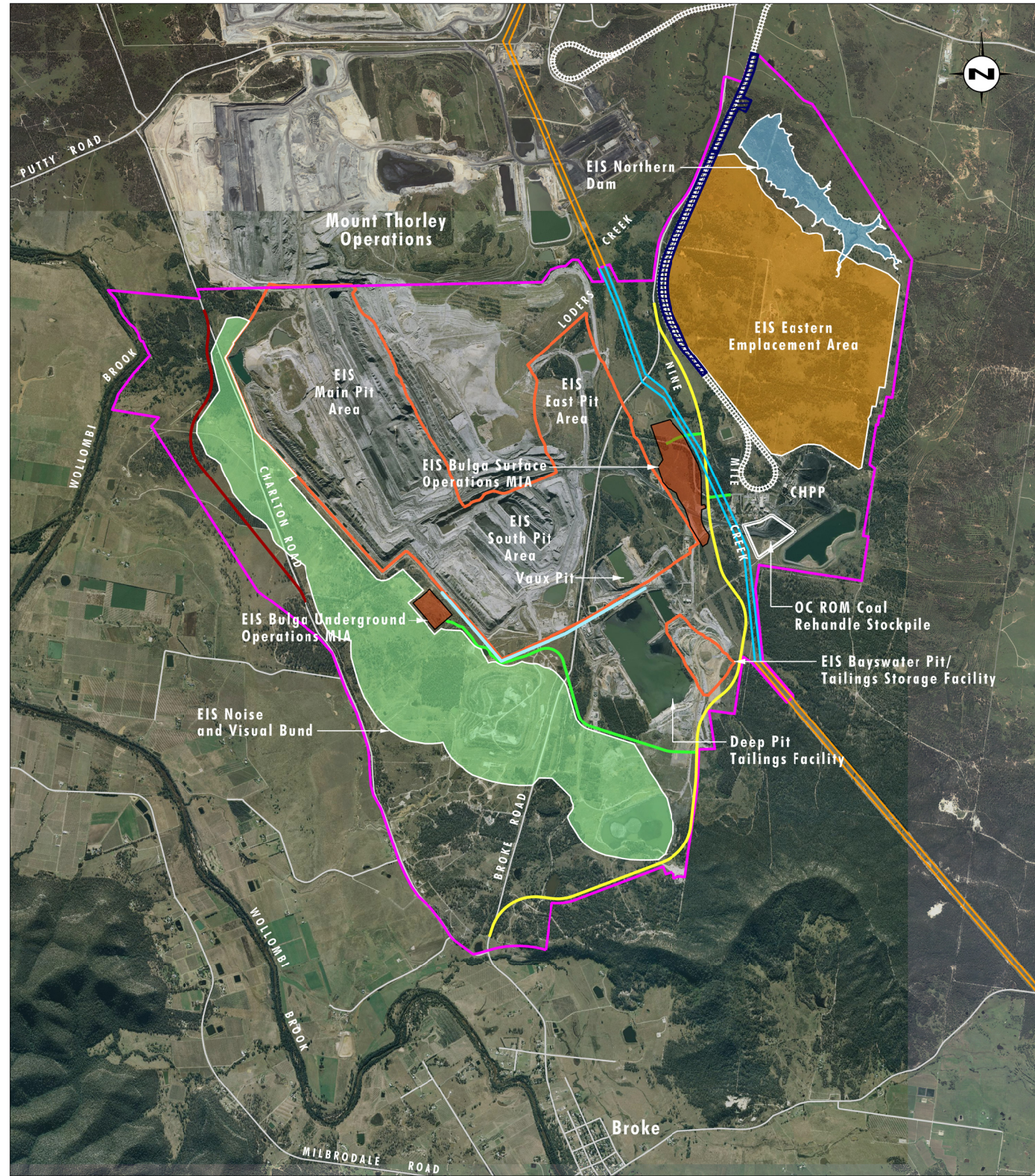
The Environmental Impact Statement submitted for the Bulga Optimisation Project (Umwelt 2013a) (BOP EIS) assessed the environmental impacts of the originally proposed Bulga Optimisation Project design which included an out-of-pit overburden emplacement area located to the north of the BCC Infrastructure Area (refer to **Figure 1.2**). This included emplacement on an area of land owned by Mushroom Composters Pty Ltd (Mushroom Composters). This emplacement area was called the EEA. As part of the assessment process for the Bulga Optimisation Project, BCM submitted amendments to the project design to address a number of environmental and social aspects detailed in the Bulga Optimisation Project Response to Submissions and Revised and Amended Project Application Assessment Report (Revised Project Report). One of these amendments included a modified EEA design that it did not involve emplacement on the land owned by Mushroom Composters (refer to **Figure 1.2**). This amended EEA design enabled overburden from the East Pit and South Pit areas to be emplaced in an efficient manner which minimised the noise and air quality impacts associated with handling this material, relative to alternative options of a single large southern out-of-pit emplacement area or uneconomic rehandle in pit. This is the currently approved EEA design.

Since the approval of the Bulga Optimisation Project, ongoing consultation with the Mushroom Composters has identified the opportunity for a further revision of the design for the EEA which would meet the needs of both companies. The proposed design occupies some of the land adjacent to the Stage 1 Mushroom Composting Facility but does not directly impact on that facility (refer to **Figure 1.3**). The key benefits of this revised design include the removal of the need to construct a haul road bridge across the access road to the Stage 1 Mushroom Composting Facility which will reduce the direct interaction between the two operations. Further, the proposed revision of the EEA design is located further away from the residents to the north and north east on the Mitchell Line of Road.



FIGURE 1.1
Locality Plan

EIS Project Design



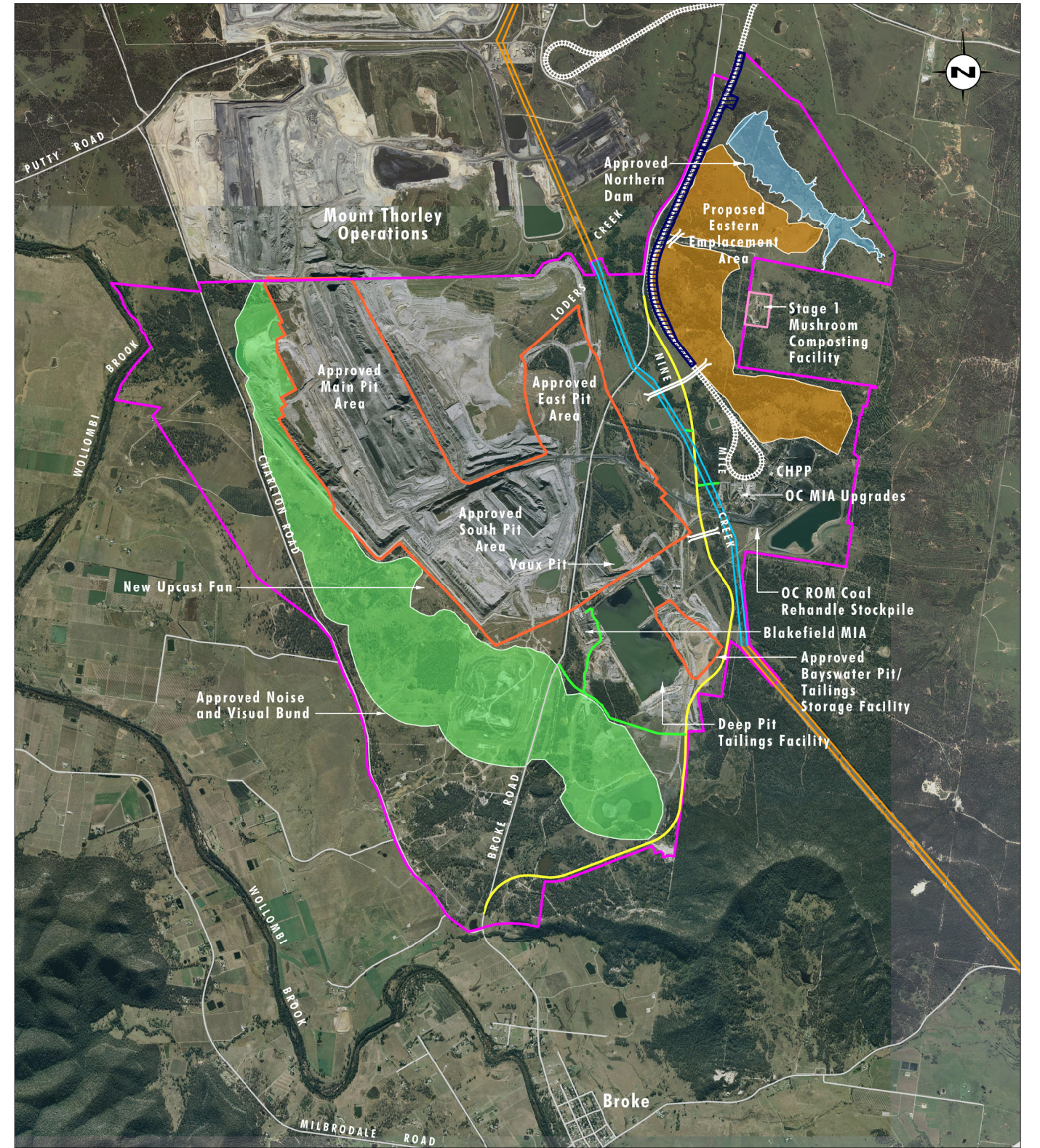
Source: AAM Hatch Pty Limited (March 2012), BCM (2013)

Legend

- Project Area
- Coal Extraction Area
- EIS Noise and Visual Bund
- EIS Eastern Emplacement Area
- EIS Northern Dam
- EIS Rail Siding
- EIS Broke Road Realignment
- EIS Charlton Road Realignment
- EIS BCC Access Roads
- Existing 330kV Transmission Line
- EIS 330kV Transmission Line Realignment
- EIS Conveyor
- Existing Rail Line

File Name (A3): R19/2869_986.dgn
20160708 14.54

Approved Project Design



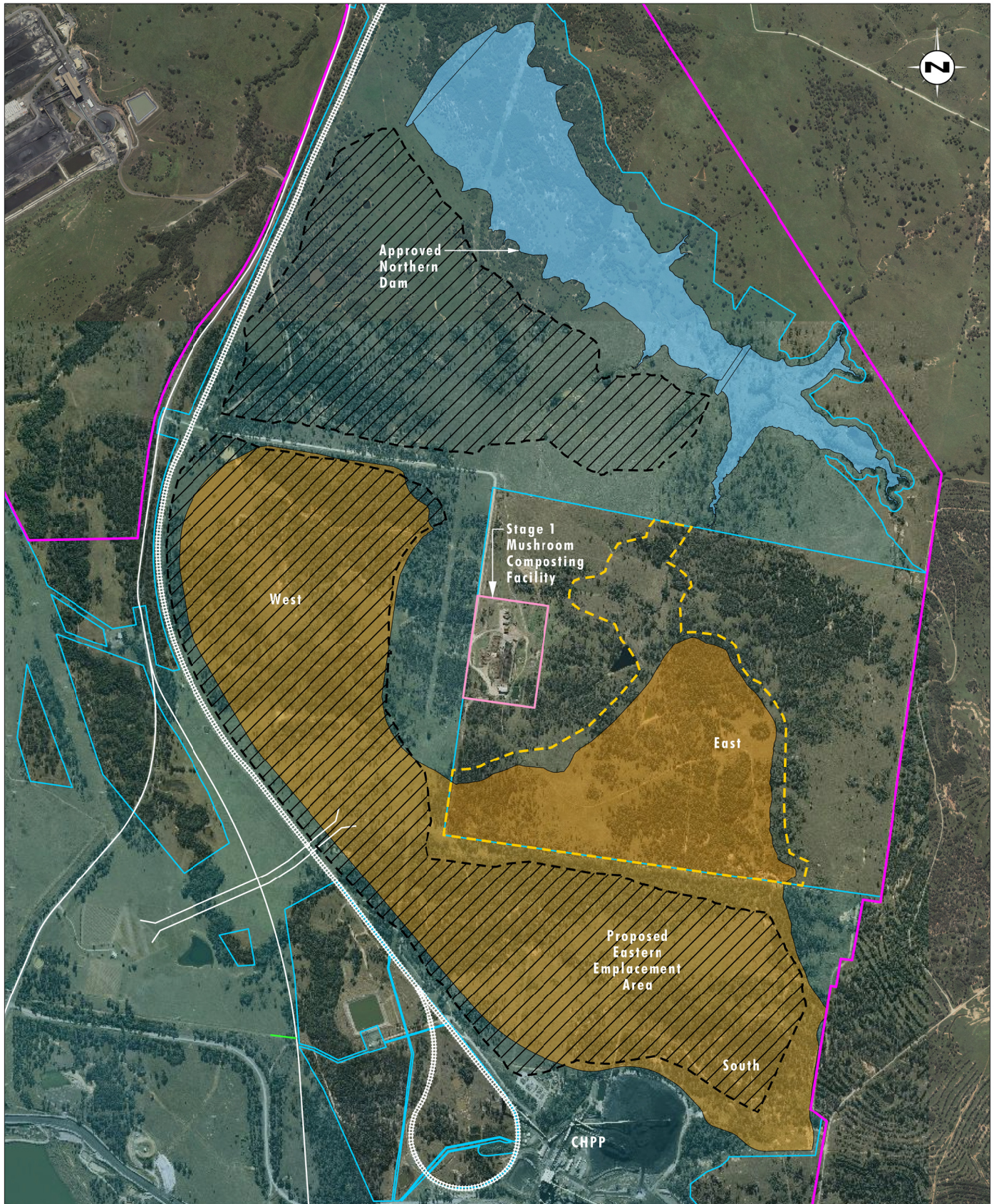
0 1.0 2.0 3.0km
1:65 000

Legend

- Project Area
- Coal Extraction Area
- Approved Noise and Visual Bund
- Approved Eastern Emplacement Area
- Approved Northern Dam
- Approved Rail Siding
- Approved Broke Road Realignment
- Approved BCC Access Roads
- Existing 330kV Transmission Line
- Approved 330kV Transmission Line Realignment
- Existing Rail Line

FIGURE 1.2

BOP EIS Project Design and Approved Project Design



Source: AAM Hatch Pty Limited (March 2012), BCM (2013)

0 0.25 0.5 1.0 km
1:20 000

Legend

- ▭ Revised Project Area
- ▭ Approved Project Disturbance Footprint
- ▭ Additional Disturbance Area
- ▭ Proposed Revised EEA
- ▭ Approved EEA
- ▭ Approved Northern Dam
- ▭ Approved BCC Access Roads
- ▭ Existing Rail Line

FIGURE 1.3
Revised EEA Design

The revised EEA design which is the subject of the proposed modification is located wholly within the footprint of the EEA assessed as part of the BOP EIS. Therefore all of the area impacted by the revised EEA design has been previously subject to detailed environmental survey and assessment. The revised EEA design does not include the approved area of the EEA north of the existing access road into the Stage 1 Mushroom Composting Facility which was assessed in both the BOP EIS and the Revised Project Report (Umwelt, 2013b).

The approved tailings emplacement strategy for the BCC includes the disposal of fine tailings in underground workings. Having regard to the decision that was announced by BCM in December 2015 to suspend mining activities at the Bulga Underground towards the end of 2017, placement of the original planned volumes of tailings underground is not practicable within the required timeframe and would inhibit the future underground mining of the underlying seams and sterilise coal resources. Therefore, BCM has developed a revised tailings management strategy for the BCC which includes disposing of tailings in the Main Pit within the open cut mining area in addition to the other approved tailings emplacement areas.

This Statement of Environmental Effects (SEE) has been prepared to assess the environmental and social impacts of the proposed modifications to the Bulga Surface Operations.

1.2 The Applicant – Bulga Coal Management

Bulga Coal Management Pty Ltd is owned by Oakbridge Pty Ltd, which also is the majority participant (87.5%) in the Bulga Joint Venture. Glencore is the majority shareholder of Oakbridge Pty Ltd.

1.3 Brief History of Mining Operations at Bulga Coal Complex

1.3.1 Open Cut Mining

Open cut mining was approved at the BCC in 1981 and has been carried out since 1982 when the site was first operated as a truck and shovel open cut coal mine to the east of Broke Road. This mine was known as Saxonvale Colliery. In 1990, development consent was granted for an expansion to the west of Broke Road. A dragline was acquired in 1996 to supplement the truck and shovel mining fleet.

In 1999, the Bulga Mine Open Cut Consent was granted enabling open cut mining to continue until 2025. The Open Cut Consent consolidated the previous open cut development consents and allowed for a maximum production rate from the open cut mining operation of 12.2 Mtpa ROM coal.

In 2014, the Bulga Optimisation Project was approved as a State Significant Development (SSD), with the granting of development consent SSD-4960. This development consent authorises the current open cut mining operations at the BCC and has replaced the previous Open Cut Consent. The approved Bulga Surface Operations is shown in **Figure 1.2**.

The Bulga Optimisation Project was also approved by the Commonwealth Department of the Environment (DoE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) 2012/6637. This approval authorises the current open cut mining operations at the Commonwealth level.

1.3.2 Underground Mining

Underground operations commenced at BCC at South Bulga Colliery using longwall extraction methods in 1994. In 2004, the current Bulga Mine Underground Consent was granted (DA 376-8-2003), authorising underground longwall mining in the Whybrow, Blakefield, Glen Munro and Woodlands Hill seams. This proposed modification will not impact on any approved underground mining operations nor amend the underground consent. The underground operations are not considered further in this assessment.

The underground mine also operates under a Commonwealth Approval 2002/773 which provides the necessary authorisation for the underground operations under the EPBC Act.

1.4 Overview of Existing Environment

1.4.1 Land Use and Ownership

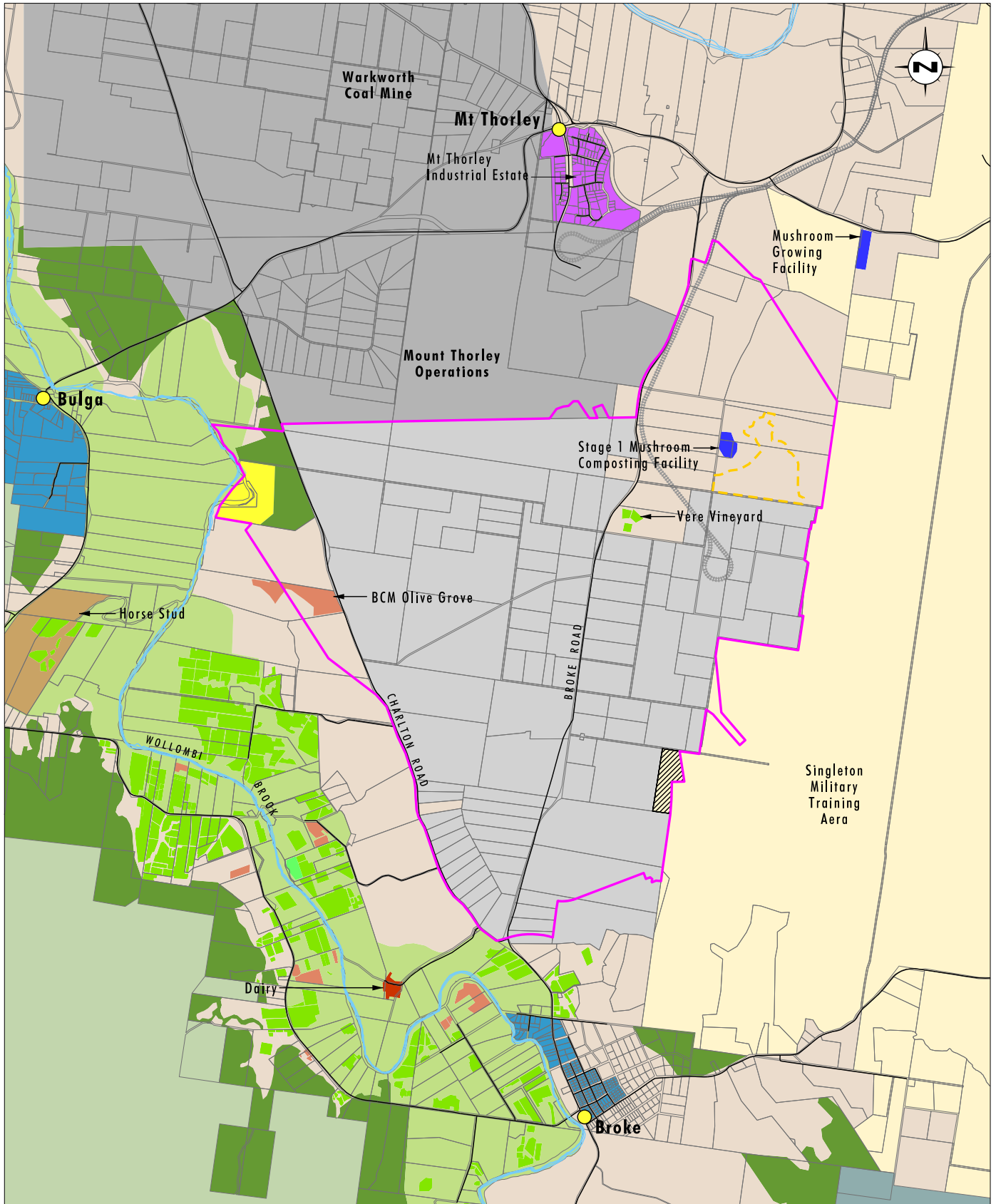
The land surrounding the revised EEA (**Figure 1.4**) is dominated by mining, rural landholdings, tourism, agriculture, rural industries and the Singleton Military Training Area. Singleton is located approximately 12 kilometres to the north of the BCC with the villages of Bulga, Milbrodale and Broke located within four kilometres of the BCC to the northwest, west and south respectively (refer to **Figure 1.4**). The private residences surrounding the Project Area are shown on **Figure 1.5**.

All activities associated with the proposed modification will be undertaken on BCM owned land with the exception of part of the modified design of the EEA which will be on land that is currently owned by Mushroom Composters. BCM has entered into a commercial arrangement with Mushroom Composters under which BCM has the right to purchase this land if the proposed modification is approved and the associated mining lease is granted. This land is currently not being actively used and consists of cleared grassland and native woodland. The Stage 1 Mushroom Composting Facility is located to the west of the new section of the revised EEA (refer to **Figure 1.3**). Stage 1 composting involves the initial development of compost prior to secondary and tertiary treatment for mushroom growing purposes. The Stage 1 Mushroom Composting Facility is associated with a mushroom growing enterprise located on the Mitchell Line of Road approximately 3 km north of the revised EEA. As noted above, BCM has entered into an agreement with Mushroom Composters that allows for the land to be acquired by BCM and used for overburden emplacement and associated activities. Mushroom Composters has provided a letter supporting the proposed modification – refer to **Appendix 1**.

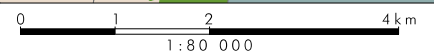
A revised schedule of land for the Bulga Optimisation Project development consent (SSD-4960) including the Mushroom Composters land to be acquired by BCM and used for the revised EEA (Lot 1 DP 136366 and Lot 82 DP 1006883) is included in **Appendix 2**.

1.4.2 Environmental Context

The revised EEA is located within the north eastern portion of the BCC and is bordered by the approved portions of the EEA to the west, south and north. The area outside of the existing approved disturbance area for the Bulga Surface Operations which requires disturbance for overburden emplacement (hereafter the revised EEA) is located within the Loders Creek catchment and consists of a range of woodland and grassland vegetation communities. The land is zoned for agricultural use and currently provides an area of buffer land between the Stage 1 mushroom composting facility and adjoining land holdings.



Source: Google Earth (2010), LPMA

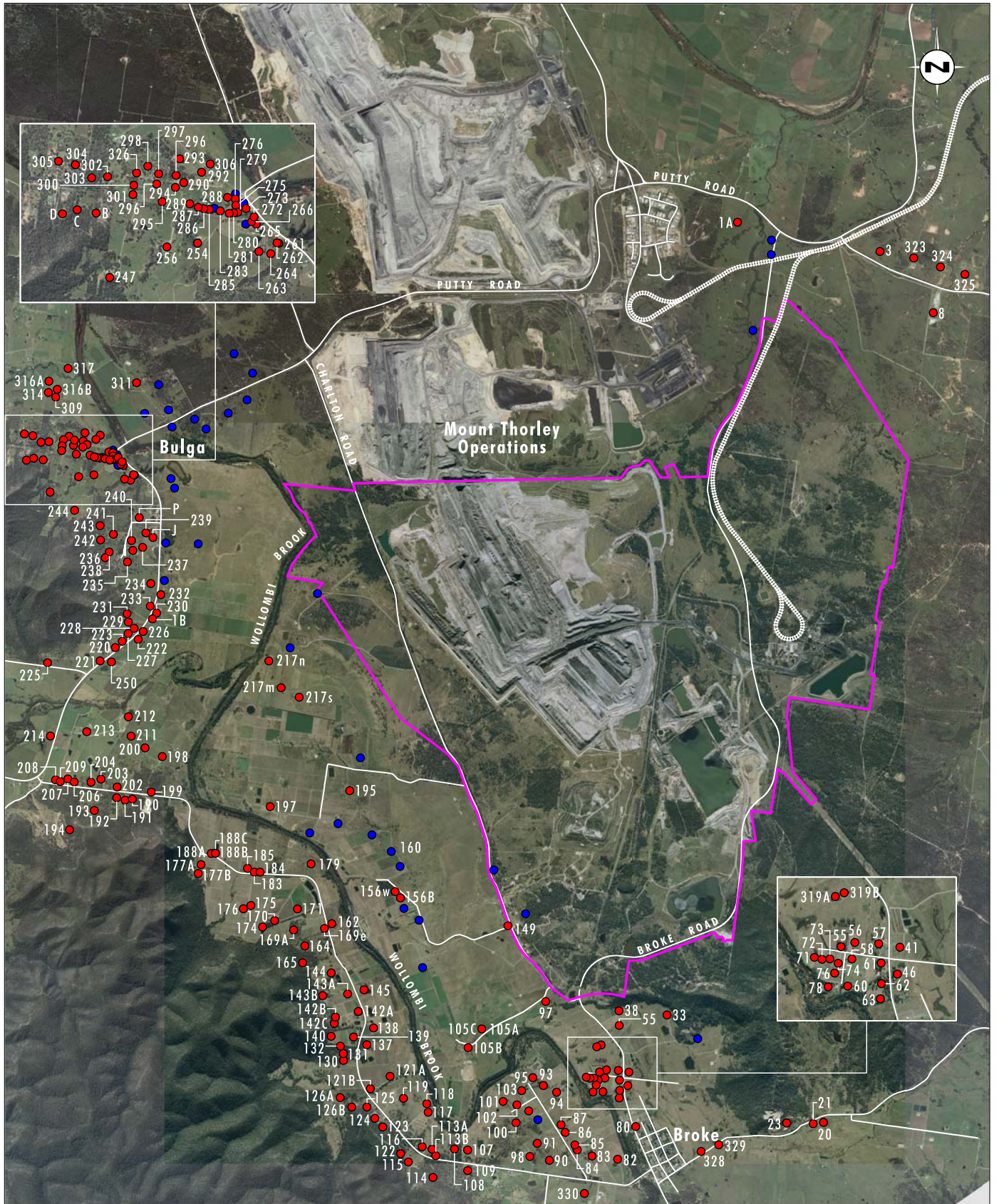


Legend

- | | | |
|----------------------------------|---|------------------------|
| Revised Project Area | MTW Operations | Industrial |
| Additional Disturbance Area | Conservation - Private | Village/Small Holdings |
| National Park | Forest/Woodland Area - Private Management | Town/Village Centres |
| State Forest | Olive Grove | |
| Singleton Military Training Area | Vineyards | |
| SMTA Licensed to BCM | Mixed, Grazing and Cropping Land | |
| Bulga Mining and Buffer Area | Grazing | |

FIGURE 1.4

Surrounding Land Use



AAM Hatch Pty Limited (March 2012), BCM (2013)

0 1.0 2.0 4.0 km
1:80 000

Legend

- Revised Project Area
- Mine Owned Residence
- Private Residence

FIGURE 1.5

Residence Locations

2.0 Overview of Approved Operations

As outlined in **Section 1.3.1**, the Bulga Optimisation Project was approved in 2014. A brief overview of the currently approved Bulga Surface Operations is provided below, with the layout of the approved operations shown on **Figure 1.2**.

The Bulga Surface Operations are approved to and employ approximately 700 people and operates 24 hours per day, 7 days per week operation with approval to mine approximately 230 million tonnes (Mt) of run-of-mine (ROM) coal. The Surface Operations have approval to mine up to 12.2 Mt per annum (Mtpa) ROM coal and to process up to 20 Mtpa ROM coal through the Bulga coal handling and preparation plant (CHPP) which receives coal from both the surface and underground mining operations. It is anticipated the mine life of the approved Bulga Surface Operations will be approximately 22 years (to 2035) with further rehabilitation and closure works being carried out after the end of this period.

Bulga Surface Operations currently mine in a number contiguous pit areas as outlined below:

- the Main Pit with extraction of coal to the base of the Woodlands Hill seam
- the East Pit with extraction of the steeply dipping seams in the Whittingham Coal Measures
- the South Pit which will ultimately mine down to the Broonie seam series
- the Bayswater Pit, mining shallow coal reserves which will be used for tailings storage once mining is complete.

Key approved mine infrastructure at BCC includes

- open cut mine infrastructure area (MIA).
- underground MIA
- CHPP
- water management infrastructure including the 3000 ML Surge Dam and 2000 ML Northern Dam.

The Bulga Surface Operations currently emplaces overburden in two out-of-pit emplacement areas. The Noise and Visual Bund located generally west of the open cut mining area is one such emplacement area and is designed to minimise the noise and visual impacts of the ongoing mining operations. The EEA enables overburden from the eastern side of the open cut operations to be handled in a manner that minimises noise and air quality impacts to the majority of residents around the BCC. Overburden is also emplaced in pit.

The currently approved tailings emplacements include disposal in the Deep Pit and the Bayswater Pit. Tailings are also approved to be disposed of in the underground workings. Coarse rejects and paste thickened tailings are co disposed with overburden.

3.0 Proposed Modification

The proposed modification relates to the revised design of the EEA (referred to in this SEE as the revised EEA) and the proposed additional in pit tailings storage facility. **Figure 3.1** shows the indicative design of the revised EEA which is the subject of a commercial agreement between BCM and the owners of the Mushroom Composting Facility. It is proposed that the Stage 1 Mushroom Composting Facility will remain operational during the construction and operation of the revised EEA. **Figure 1.3** shows a comparison of the approved EEA design and the revised EEA.

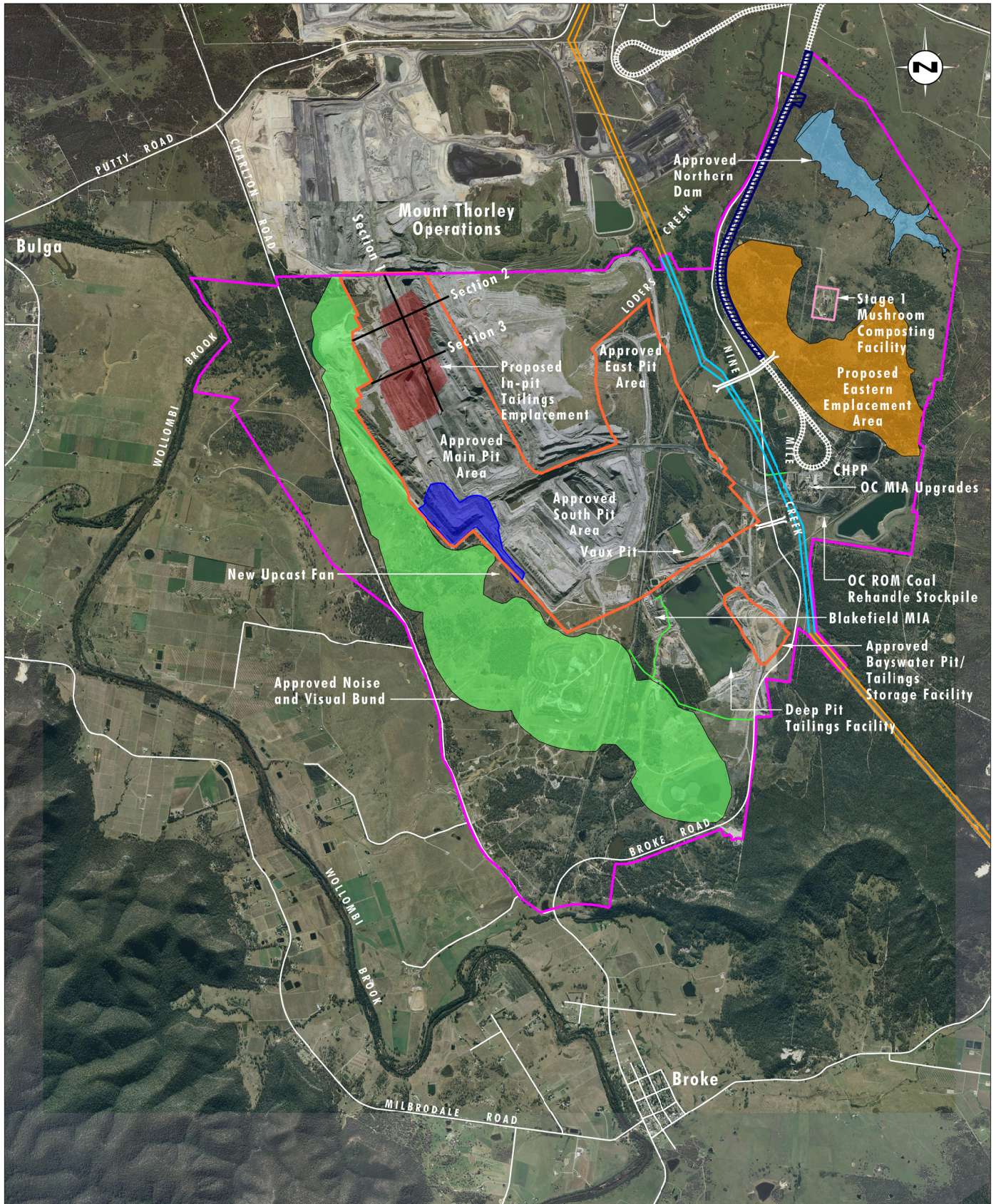
The differences between the approved development and the proposed modified development are summarised in **Table 3.1**. **Sections 3.1 to 3.5** provide further detail of the aspects of the proposed modification which differ to the approved development. Those aspects of the approved operations that are not discussed in this section remain unchanged.

Table 3.1 Comparison of Approved Development and Proposed Modification

Project Component	Approved Development (SSD 4960)	Proposed Modification
Total Production	205 Mt (including 30Mt of previously approved reserves).	No change.
Annual Production Limit	Up to 12.2 Mtpa ROM coal from the Bulga Surface Operations and up to 20 Mtpa ROM coal through the coal handling and preparation plant (CHPP).	No change.
Life of Mine	21 years to approximately 2035 (with subsequent rehabilitation and closure works).	No change.
Capital Expenditure	Approximately \$420 Million.	No change.
Construction Employees	Approximately 300 construction employees, predominately in the first three years of the Project.	No change.
Operational Employees	Employment of approximately 700 full time employees, decreasing towards the end of the Project.	No change.
Operating Hours	24 hours per day, 7 days per week.	No change.
Mining Areas	Three contiguous pit areas (Main Pit, East Pit and South Pit) plus Bayswater Pit as shown on Figure 3.1 .	No change.
Mining Methods	Open cut mining (including some highwall mining).	No change.

Project Component	Approved Development (SSD 4960)	Proposed Modification
Open Cut MIA	<p>Upgrade of existing MIA infrastructure and buildings.</p> <p>Enlargement of ROM and product coal stockpile areas.</p>	No change.
Eastern Emplacement Area	Emplacement area constructed around the land on which the Stage 1 Mushroom Composting is located. Refer to Figure 1.2 .	Revised EEA (refer to Figures 1.3 and 3.1).
Project Area	Project Area (approximately 4672 hectares) excluded land owned by Mushroom Composters (refer to Figure 1.2).	The Project Area (approximately 4879 hectares) amended to include land owned by the Mushroom Composters (refer to Figure 1.3).
Noise and Visual Bund	Out of pit emplacement area established along the western and southern limits of open cut operations designed as a bund to reduce noise and visual impacts.	No Change
Underground Infrastructure	<p>Continued use of existing Underground MIA workshop, bathhouse and workshop facilities.</p> <p>Construction of new ventilation facilities and underground mining support infrastructure.</p>	No Change
Water Management Infrastructure	<p>Construction and use of new approximately 3000 ML water storage dam (Northern Dam) as part of the mine water system.</p> <p>Changes to mine water management system.</p>	No change other than works associated with water management around Eastern Emplacement Area and associated works at Northern Dam.
Public Roads	Realignment of Broke Road to accommodate mining in East Pit and South Pit areas.	No Change (Realignment works completed February 2016)

Project Component	Approved Development (SSD 4960)	Proposed Modification
Tailings and Rejects Strategy	Tailings will be disposed of in the Deep Pit and Bayswater Pit with tailings also proposed to be disposed of in the underground workings. Coarse rejects and paste thickened tailings will be co-disposed with overburden.	An additional tailings storage facility will be located within the confines of the existing mining operation in the Main Pit (refer to Figure 3.1). Tailings return water will continue to be stored and re-used within the existing BCC water management system.
External Coal Transport Infrastructure	Coal transported from BCC by train via Saxonvale Rail Spur. Construction and use of a rail siding adjacent to the existing rail easement capable of parking two coal trains.	No Change.
Electricity Infrastructure	Realignment of sections of two 330 kV transmissions lines and other 66 kV and 11 kV powerlines and other changes to associated electricity infrastructure.	No Change.
Pipelines and Other Services Infrastructure	The relocation of the Broke-Fordwich Private Irrigation District (PID) water pipeline, Singleton Council Broke potable water supply pipeline and other services associated with the existing public road alignments. Infrastructure servicing the Stage 1 Mushroom Composting Facility will be relocated to provide continued service.	No Change.
Resource Definition Exploration	Ongoing borehole drilling and sampling in and adjacent to mining areas to better understand the coal resource, coal quality, geological conditions and geotechnical constraints.	No Change.
Rehabilitation	Rehabilitation of areas disturbed by BCC operations, infrastructure and construction.	No change to overall rehabilitation strategy or techniques. Final landform of the EEA modified.



Source: AAM Hatch Pty Limited (March 2012), BCM (2013)

0 1.0 2.0 3km
1:65 000

Legend

- ▭ Revised Project Area
- ▭ Coal Extraction Area
- ▭ Approved Noise and Visual Bund
- ▭ Proposed Revised EEA
- ▭ Proposed In-pit Tailings Emplacement
- ▭ Approved Northern Dam
- ▭ Approved Rail Siding
- ▭ Approved BCC Access Roads
- ▭ Existing 330kV Transmission Line
- ▭ Approved 330kV Transmission Line Realignment
- ▭ Approved Underground Access via Open Cut
- ▭ Existing Rail Line

FIGURE 3.1

Proposed Modified Development

The proposed modification is described further below.

3.1 Revised Mine Plan

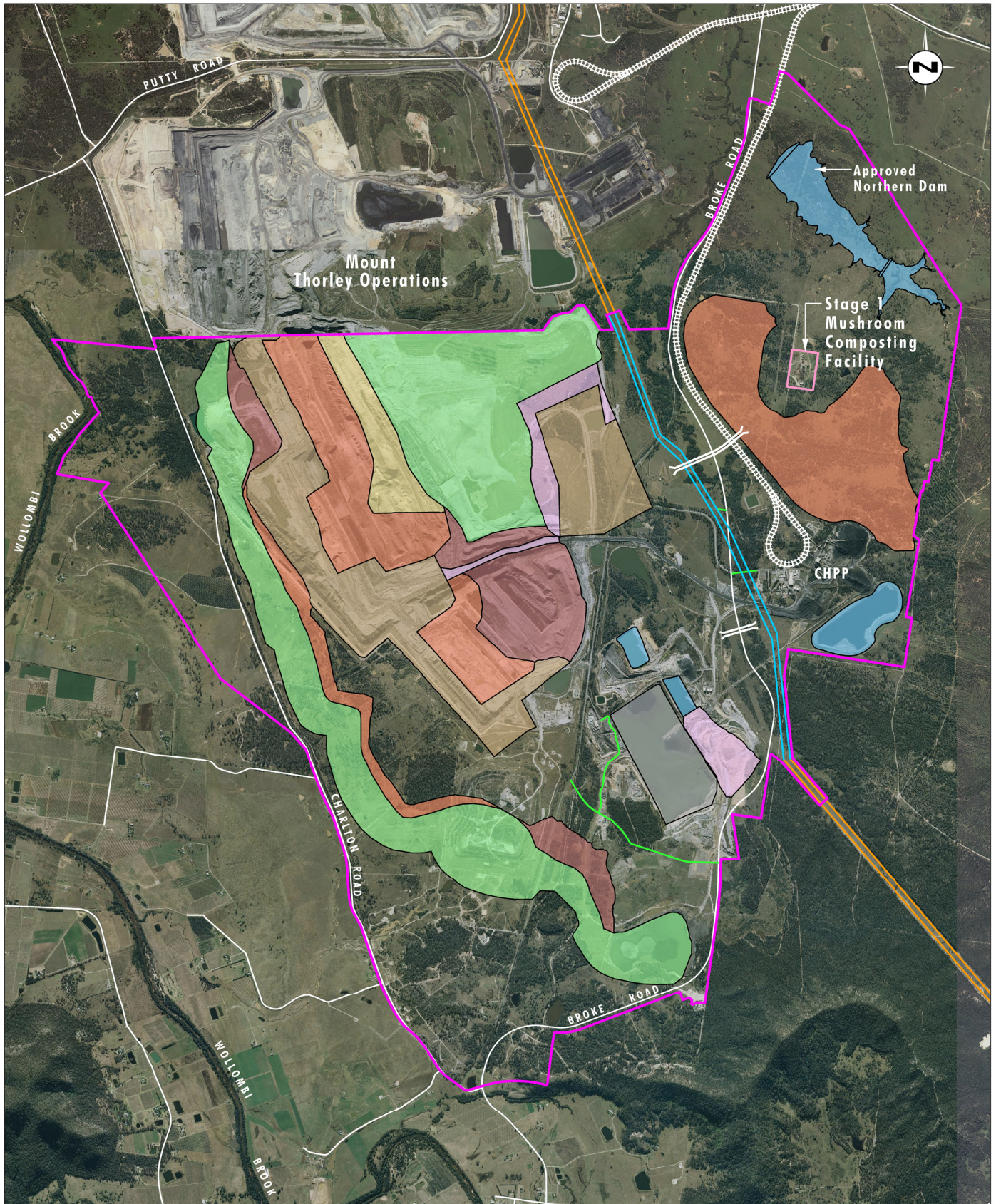
3.1.1 Mining areas and methods

No change is proposed to the open cut mining area. The proposed modification only relates to a change in the design of the EEA, changes associated with the design of water management infrastructure related to the changed design of the EEA and provision for an in pit tailings disposal area in the Main Pit.

Indicative mine plans for the proposed modification representing the key stages of the development are shown on **Figures 3.2 to 3.5**, for Years 4, 7, 13 and 19. The proposed modification primarily relates to development of the revised EEA commencing in around Year 3, with preparatory works (e.g. drainage works) commencing in Year 2. The changes to the EEA are reflected in the indicative mine plans for years 4 (**Figure 3.2**) and 7 (**Figure 3.3**) and the final landform in this area in the final stages of the Bulga Surface Operations (refer to **Figure 3.6**). The completion of the EEA overburden emplacement and final shaping and rehabilitation is expected to be completed by approximately Year 9.

As shown on **Figures 3.2 to 3.5**, the areas disturbed by mining activities will be progressively rehabilitated throughout the life of the mine to achieve a suitable final landform. No change to the approved rehabilitation strategy or techniques is proposed. The conceptual final landform for the proposed modification (refer to **Figure 3.6**) is generally consistent with the approved conceptual final landform, with some changes to reflect the EEA landform. The design principles adopted for the revised EEA are consistent those used for the approved EEA. The in pit tailings emplacement within the Main Pit is not planned to change the final landform of the in pit emplacement area, however, it may result in some changes to the timing of emplacement in Main Pit depending on the time ultimately required to dry the tailings prior to capping.

The concept plans which form the basis of this assessment have been designed in consideration of current mining techniques and technologies and are based on BCM's current understanding of local geology. Mining operations are, however, dynamic and the specific mine plan layout and sequence shown in the indicative mine plans may be subject to changes due to, for example, economic conditions, technological advances and operational needs or as further geological data is gathered.



Source: AAM Pty Limited (March 2012), BCM (2013)

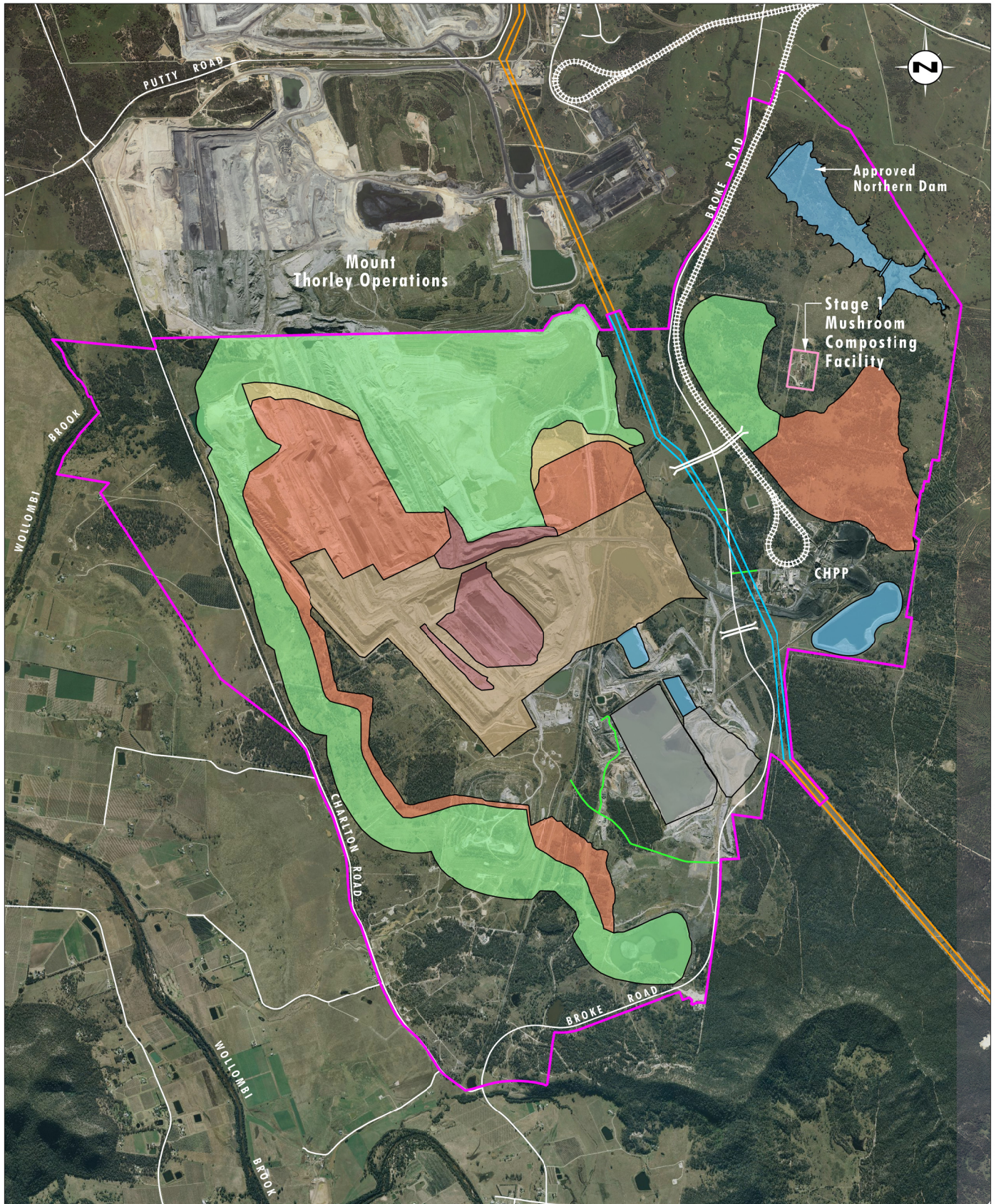
0 1 2 2.75 km
1:55 000

Legend

- | | | |
|----------------------------------|--------------------------|-------------------|
| Revised Project Area | Active Pit | Tailings Facility |
| Existing 330kV Transmission Line | Inactive Pit/Haul Route | |
| Approved 330kV Transmission Line | Temp Rehab/Stabilised | |
| Approved BCC Access Roads | Rehabilitation | |
| Railway Line | Shaped not Seeded | |
| Approved Haul Road Bridge | Main Mine Water Storages | |
| Active Overburden | Dam Wall | |

FIGURE 3.2

Indicative Mine Plan - Year 4



Source: AAM Pty Limited (March 2012), BCM (2013)

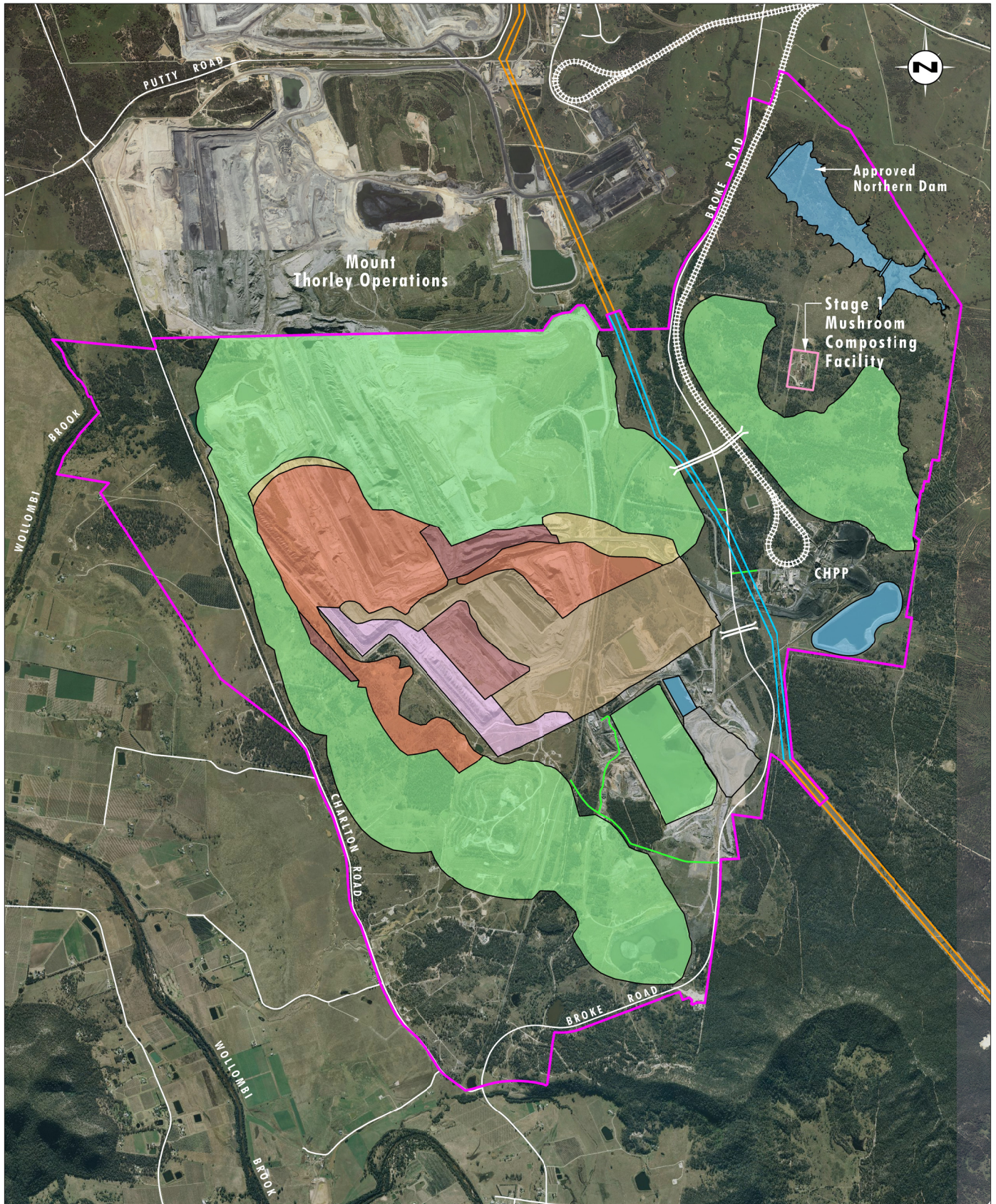
0 1 2 2.75 km
1:55 000

Legend

- | | | |
|----------------------------------|--------------------------|-------------------|
| Revised Project Area | Active Pit | Tailings Facility |
| Existing 330kV Transmission Line | Inactive Pit/Haul Route | |
| Approved 330kV Transmission Line | Temp Rehab/Stabilised | |
| Approved BCC Access Roads | Rehabilitation | |
| Railway Line | Shaped not Seeded | |
| Approved Haul Road Bridge | Main Mine Water Storages | |
| Active Overburden | Dam Wall | |

FIGURE 3.3

Indicative Mine Plan - Year 7



Source: AAM Pty Limited (March 2012), BCM (2013)

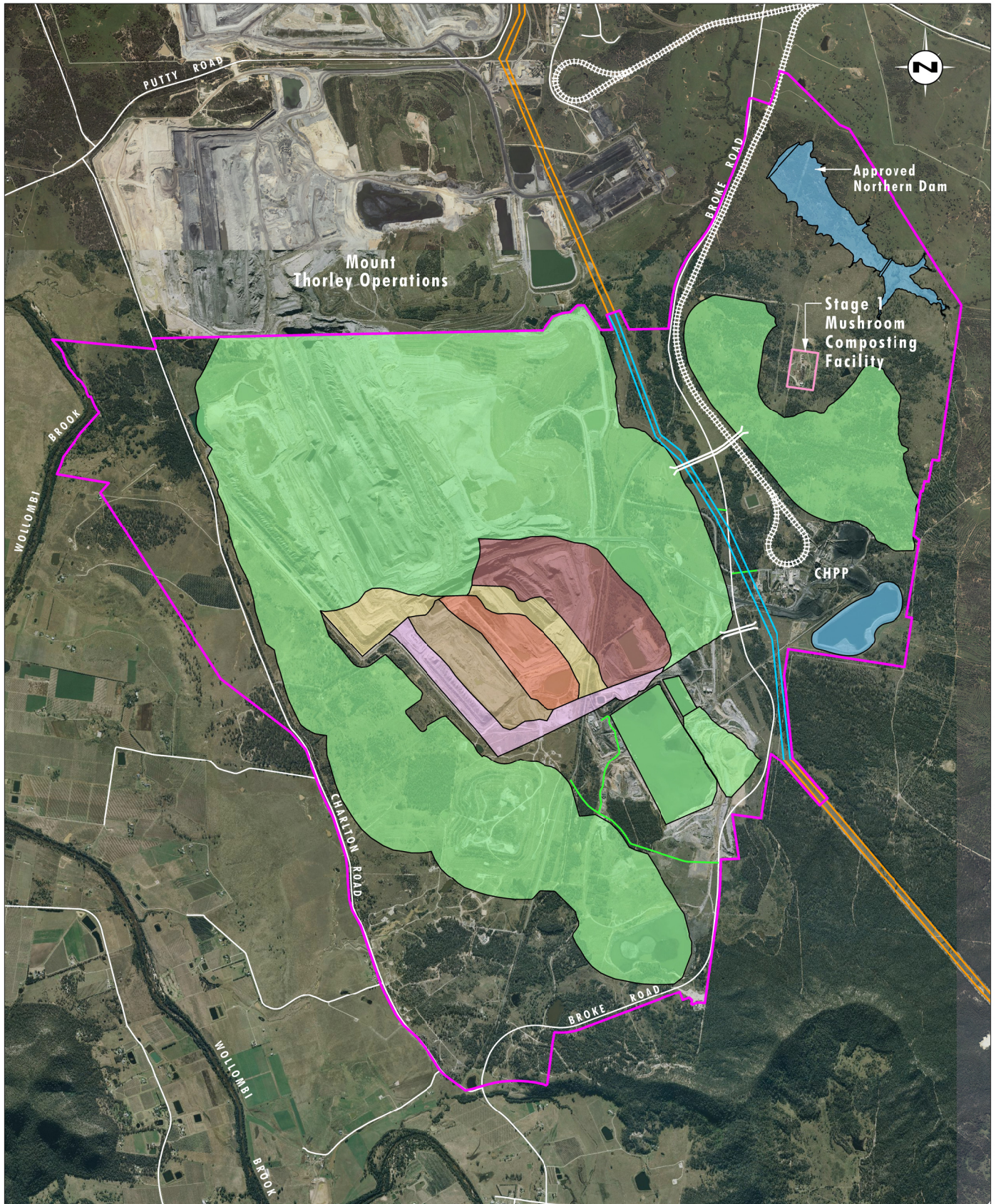
0 1 2 2.75 km
1:55 000

Legend

- | | | |
|----------------------------------|--------------------------|-------------------|
| Revised Project Area | Active Pit | Tailings Facility |
| Existing 330kV Transmission Line | Inactive Pit/Haul Route | |
| Approved 330kV Transmission Line | Temp Rehab/Stabilised | |
| Approved BCC Access Roads | Rehabilitation | |
| Railway Line | Shaped not Seeded | |
| Approved Haul Road Bridge | Main Mine Water Storages | |
| Active Overburden | Dam Wall | |

FIGURE 3.4

Indicative Mine Plan - Year 13



Source: AAM Pty Limited (March 2012), BCM (2013)

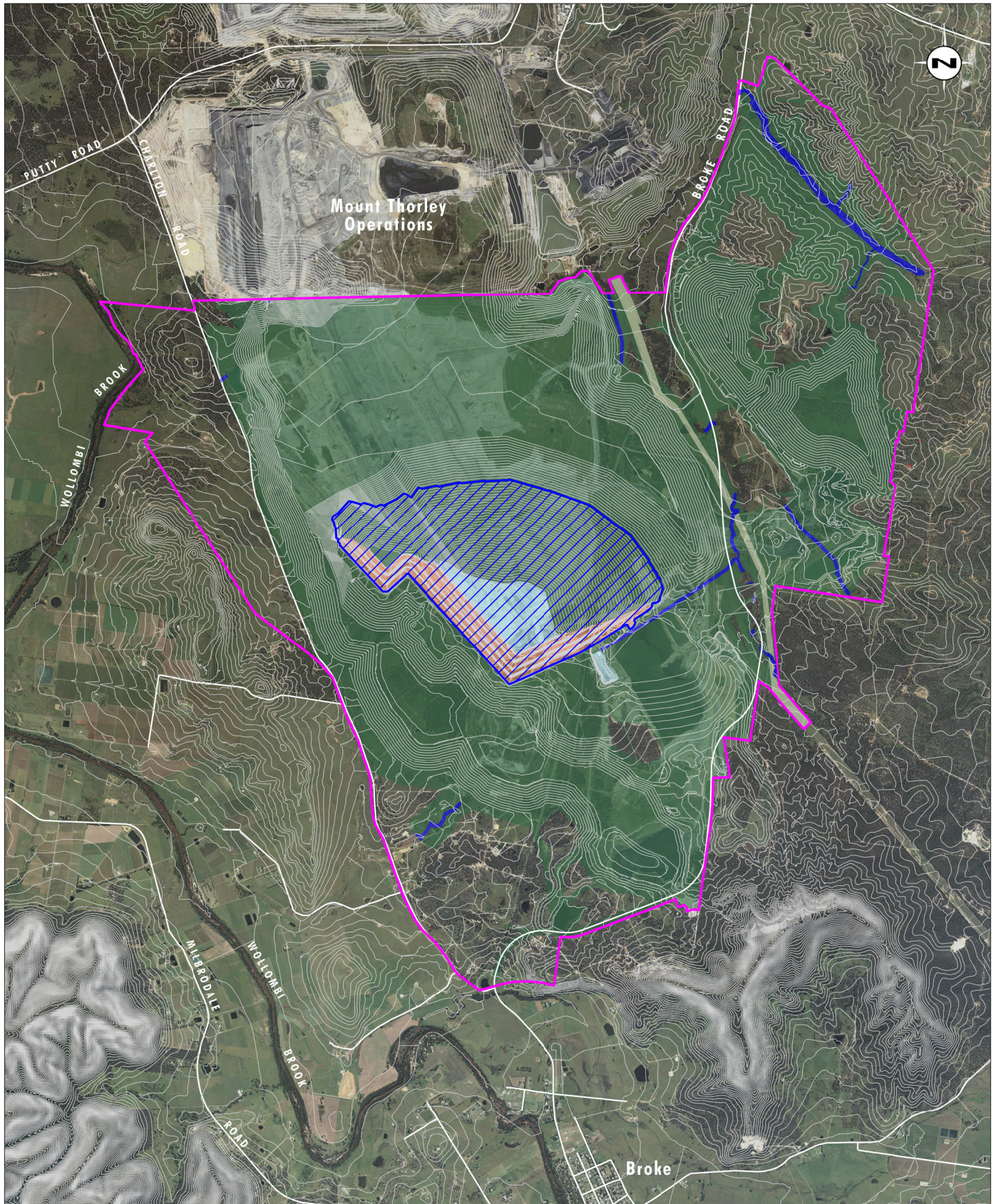
0 1 2 2.75 km
1:55 000

Legend

- | | | |
|----------------------------------|--------------------------|-------------------|
| Revised Project Area | Active Pit | Tailings Facility |
| Existing 330kV Transmission Line | Inactive Pit/Haul Route | |
| Approved 330kV Transmission Line | Temp Rehab/Stabilised | |
| Approved BCC Access Roads | Rehabilitation | |
| Railway Line | Shaped not Seeded | |
| Approved Haul Road Bridge | Main Mine Water Storages | |
| Active Overburden | Dam Wall | |

FIGURE 3.5

Indicative Mine Plan - Year 19



Source: AAM Pty Limited (March 2012), BCM (2013), EMGA

0 1 2 3 km
1:60 000

Legend

- ▭ Revised Project Area
- ▭ Woodland
- ▭ Water
- ▭ Grassland
- ▭ Riparian Revegetation
- ▭ Highwall
- ▭ Maximum Void Water Level

FIGURE 3.6

Conceptual Final Landform and Rehabilitation Areas

3.1.1.1 Eastern Emplacement Area

The EEA enables overburden from the East Pit and South Pit areas to be emplaced in an efficient manner which minimises the noise and air quality impacts from the approved operations associated with handling this material, relative to alternative options of a single large southern out-of-pit emplacement area or an uneconomic rehandle in pit.

The EEA will be developed to the east of the mining area during the development of the East and South Pit areas, commencing in approximately Year 3. The current approved design of the EEA avoids land that is currently owned by the Mushroom Composters, including the Stage 1 Mushroom Composting Facility (refer to **Figure 1.3**). A commercial arrangement has now been reached with the Mushroom Composters which would enable overburden to be emplaced on land to the east of the Stage 1 Mushroom Composting Facility with the facility remaining *in situ*. BCM has the right to purchase that portion of the Mushroom Composters land that relates to the revised EEA, and the land on which the Stage 1 Mushroom Composting Facility occurs will continue to be owned by Mushroom Composters.

The development of the currently approved northern section of the EEA would have required the construction of a haul bridge over this access road (refer to **Figure 3.1**). The agreement with the Mushroom Composters has removed the need for overburden to be emplaced north of the existing access road into the Stage 1 Mushroom Composting Facility. The revised EEA will no longer include overburden emplacement north of the access road.

The revised EEA will be emplaced to a height of approximately RL 150 mAHD however selected areas may be emplaced to RL 165 mAHD to introduce micro relief features into the landform consistent with surrounding terrain and BCM's rehabilitation strategy commitments.

The revised EEA is expected to be completed in approximately five years, followed by final rehabilitation.

3.1.2 Mining fleet

The Proposed Modification will not result in any change to mining fleet.

3.2 Revised Tailings Emplacement Strategy

As discussed in **Section 1.1**, the approved tailings emplacement strategy for the BCC includes the disposal of tailings in underground workings. Since the Bulga Optimisation Project development consent SSD 4960 was granted in December 2014, the decision has been made to suspend mining operations at the Bulga Underground, with such suspension taking effect towards the end of 2017. As a result of this decision, underground mining will not be sufficiently advanced to implement the previously planned underground placement of tailings at the time it will be required. Another consequence of the suspension of underground mining is that the placement of tailings in the existing underground mining areas (i.e. those areas currently mined) would prevent the future underground mining of the underlying seams and therefore sterilise part of the coal resource. BCM has therefore developed a revised tailings management strategy for the BCC and in addition to the existing approved in pit tailings emplacement areas it is proposed to establish a tailings emplacement area in the Main Pit within the confines of the *in situ* mine void as shown in **Figure 3.1**.

The cross section shown in **Plate 1** conceptually shows how the tailings will be emplaced within the confines of the *in situ* mine void (un-dug ground) thus minimising seepage away from the emplacement areas. The tailings emplacements will ultimately be enveloped by spoil and the final landform. The open cut mine void and surrounding underground mining has created a regionally extensive depressurisation of the intersected coal seams. This creates a hydrogeologically benign setting for the emplacement of tailings.

1

2
50mm AT FULL SIZE

3

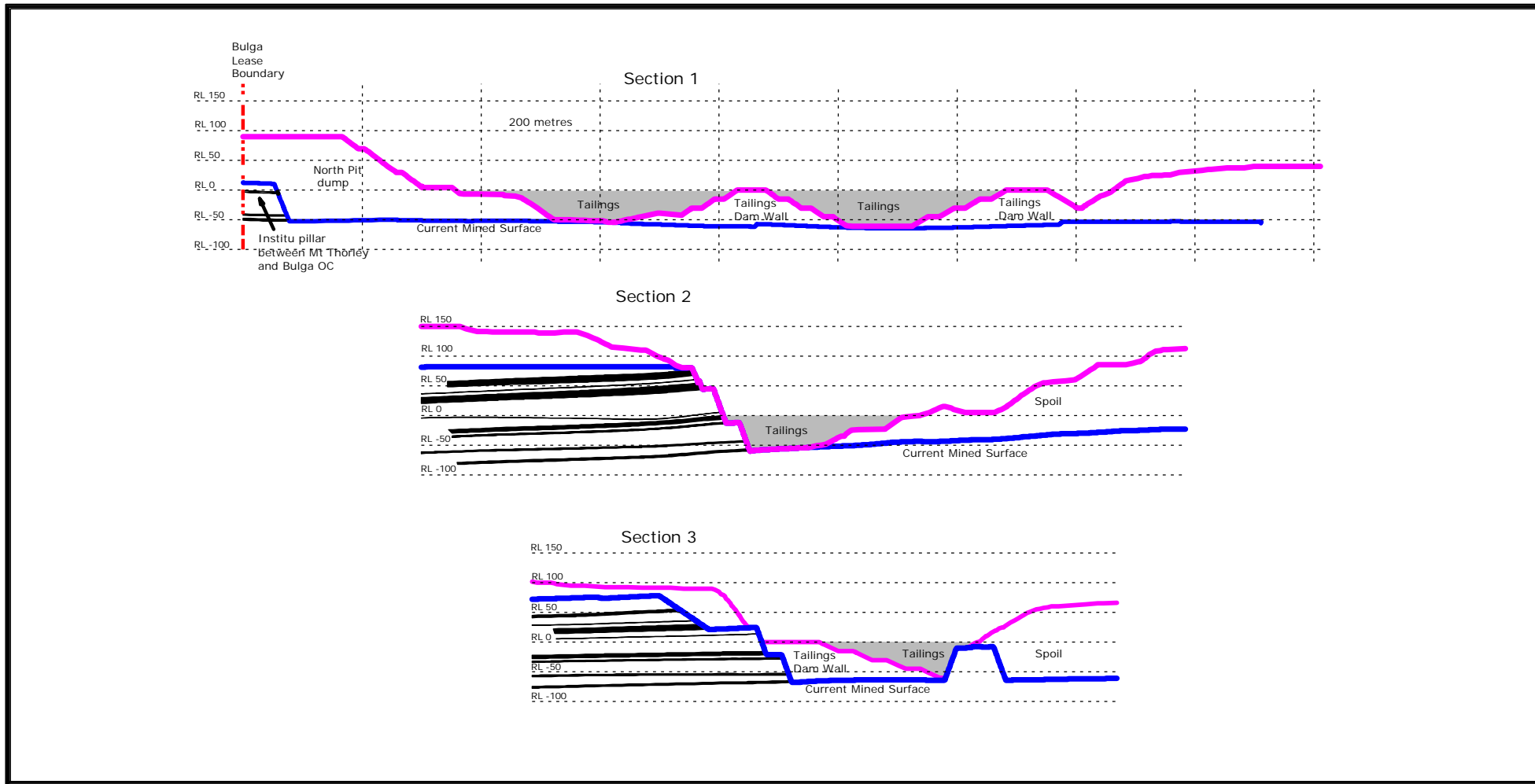
4

5

6

A

A



B

B

C

C

Aerial Photo Date:

REVIEW	NAME	SIGN	DATE	SITE Bulga Open Cut	DEPARTMENT Technical Services	TITLE Plate 1 - Proposed Tailings Dam					
DRAWN	CB		08/6/16	FIGURE No.	BULGA OPEN CUT	DRAWING No. 1					
CHECKED				SCALE 1:10000					REV. 1	SHEET A4	
APPROVED											
PLOTTED BY			PLOT DATE	Broke Road, Singleton NSW 2330 Australia		PMB 8, Singleton NSW 2330 Australia					
DRAWING FILE NAME				bul2015_pits_main.dgd.isis tailings_dam_080616.vpgz		Telephone 61 2 6570 2400 • Facsimilie 61 2 6570 2450					

D

D

1

2

3

4

5

6

Tailings emplacement will employ:

- multiple discharge points to enhance the beaching angle to promote dewatering and consolidation of the tailings
- secondary flocking or similar to promote the liberation and recovery of water
- effective removal of the tailings decant water.

The proposed Main Pit tailings emplacement area will be used concurrently with the other approved emplacement areas and will have an approximate capacity of 7.5 GL. Using the emplacement areas concurrently provides more opportunity to achieve improved consolidation of tailings which enables more timely and cost effective capping and rehabilitation. The design and management of the Main Pit tailings emplacement area will be detailed in the Mining Operations Plan and will be managed in accordance of the relevant provisions of the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*.

Tailings decant water will be recovered from the proposed Main Pit tailings emplacement and returned to the Bulga Complex Integrated Water Management System for storage and re-use, in a similar manner to that deployed for the current tailings emplacement areas. No additional water quantity will be produced compared to the currently approved tailings emplacement system, due to the same total quantity of tailings being emplaced. Pumps and piping will be required to service the proposed tailings emplacement area.

3.3 Infrastructure Changes

The Proposed Modification removes the need for a bridge over the access road into the Stage 1 Mushroom Composting Facility. With the exception of water management infrastructure as detailed in **Section 3.4**, the proposed modification does not affect any other approved infrastructure at the BCC.

3.4 Water Management Infrastructure

The proposed modification will require changes to the approved Bulga Complex Integrated Water Management System (IWMS). These changes relate to the water management system for the revised EEA, including clean water diversions, dirty water catch drains, a sediment dam and the tailings return water system. The changes are discussed further in **Section 6.3**. There are no changes required to the Bulga Complex IWMS to store or re-use the tailings return water from the proposed tailings emplacement area.

3.5 Revised Disturbance Area

As discussed previously, part of the revised EEA will be located in an area that is not currently approved for disturbance and accordingly the proposed modification is seeking approval for a different area of disturbance, referred to as the alternative disturbance area. As outlined further in **Section 6.6**, BCM sought to design the proposed modification to achieve an outcome of no net change in the total area of native vegetation impacted. To achieve this outcome, BCM will relinquish parts of the currently approved disturbance area. The proposed alternative disturbance area is shown on **Figure 1.3** and includes areas for emplacement of the revised EEA and associated water management structures and stockpiles including topsoil stockpiles. The areas of currently approved disturbance that are planned to be relinquished are discussed further in **Section 6.6**.

4.0 Stakeholder Engagement

4.1 Community Consultation

BCM has an ongoing community engagement program which includes regular engagement with both individuals and groups from the local and regional communities via a range of mechanisms including:

- regular newsletters (biannual) to update the community on the existing operations and Bulga Coal Complex initiatives
- face to face meetings with individuals and / or groups as required / requested, including any meetings required in response to complaints
- regular meetings (two per year) with the BCC Community Consultative Committee (CCC). The CCC comprises four community representatives, one Singleton Council representative, two state government representatives and BCM representatives.

BCM has undertaken the following consultation activities in 2016 related to the proposed modification.

Date	Activity	Details
January 2016	Cultural Heritage Steering Committee	The Proposed modification was discussed and information provided during the Steering Committee meetings
March 2016	Community Barbeque – Bulga	<ul style="list-style-type: none"> • 65 community members attended • Presentation given which showed the location of the proposed revised EEA and plans for the modification (i.e. relocation of emplacement and tailings emplacement area in pit) • A4 figure showing the proposed changes handed out to all attendees.

Date	Activity	Details
March 2016	Community Barbeque – Broke	<ul style="list-style-type: none"> • 52 community members attended • Presentation given which showed the location of the revised EEA and plans for the modification (i.e. relocation of emplacement and tailings emplacement area in pit) • A4 figure showing the proposed changes handed out to all attendees.
March 2016	Archaeology Assessment	<ul style="list-style-type: none"> • Registered Aboriginal Parties provided 28 days to review the Aboriginal Cultural Heritage Assessment for the proposed modification.
May 2016	Community Newsletter and Information Sheet	<ul style="list-style-type: none"> • Overview of modification on a double sided A4 insert • Contact details for mine personnel provided • Newsletter letterboxed dropped to all households in Broke, Milbrodale and Bulga and mailed to the newsletter mailing list • Newsletter posted on the home page of the Bulga Coal website once completed.

No community concerns regarding the proposed modification have been raised.

4.2 State Government Consultation

BCM has also undertaken a range of Government consultation related to the proposed modification as detailed below.

Date	Activity	Details
December 2015	Letter	BCM provided a letter to Department of Planning and Environment (DP&E) outlining the proposed modification seeking confirmation of the proposed approval pathway and scope of technical studies.
December 2015	Letter	BCM received a letter from DP&E indicating that DP&E was satisfied with the proposed assessment approach for the proposed modification.
January 2016	Meeting Department of Industry, Division of Resources and Energy (DRE)	BCM provided an overview of the proposed modification. The meeting also included discussion regarding requirements for a Mining Lease application for the revised EEA.
March 2016	Site Visit – Department of Planning and Environment – Senior Compliance Officer	Site visit and familiarisation completed. Presentation given which included an overview of the proposed modification, with further discussion throughout the day regarding the proposed modification.
March 2016	Site Visit - DRE	Site visit undertaken by representative of DRE as part of a regular inspection. The proposed modification was discussed during this site inspection.
March 2016	Site Visit - EPA	EPA attended site and the opportunity was taken to discuss the proposed modification.
April 2016		Mining Lease for Mining Purposes Application submitted to DRE (MLA 525)

4.3 Consultation with Mushroom Composters

Following the grant of SSD 4960 in December 2014 BCM established the Technical Review Committee as required by Condition 20 of Schedule 3. Throughout the course of 2015 the Technical Review Committee, with involvement from BCM and Mushroom Composters, developed the Eastern Emplacement Area Management Framework (EEAMF) in accordance with the requirements of Condition 19 of Schedule 3. The EEAMF was approved by the Secretary of DP&E on 13 May 2016.

In conjunction with the development of the EEAMF, BCM and Mushroom Composters engaged in negotiations regarding a commercial agreement in respect of, among other things, BCM's proposal for a revised EEA and the associated land acquisition arrangements. Formal legal agreements, which also incorporated the version of the EEAMF that had been endorsed by the Technical Review Committee, were executed by Mushroom Composters and BCM in March 2016.

As a result of entering into those commercial arrangements, BCM and Mushroom Composters have resolved the matters that were the subject of Mushroom Composters' submissions prior to determination of Development Application SSD 4960 (and which were the subject of several conditions imposed by the Planning Assessment Commission upon the grant of development consent SSD 4960).

Mushroom Composters is satisfied that their concerns have now been addressed and, as noted in **Section 1.4.1**, has provided a letter of support in respect of the proposed modification and the removal of those conditions of consent which pertain specifically to the Stage 1 Mushroom Composting Facility (refer to **Appendix 1**).

5.0 Planning Considerations

This section discusses the application of the various Commonwealth and State environmental and planning legislation and policies that are relevant to the proposed modification.

5.1 Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary environmental and planning regulatory instrument relevant to the proposed modification at a Commonwealth level. The operation of the EPBC Act and its application to the proposed modification is discussed in **Section 5.1.1** below.

The *Native Title Act 1993* is not directly relevant to the approval process for the proposed modification; however, it does have implications for the granting of mining leases under the Mining Act 1992 where there is potentially land in respect of which native title has not been extinguished within the lease application area. BCM requires a new mining lease for part of the revised EEA. BCM has undertaken an assessment of Native Title over this area which has confirmed that Native Title has been extinguished within the mining lease application area.

5.1.1 Environment Protection Biodiversity Conservation Act 1999

Under the EPBC Act, approval from the Commonwealth Minister for Environment is required for any action that may have a significant impact on Matters of National Environmental Significance (MNES).

MNES are identified in the following categories:

- World Heritage Properties
- National Heritage Places
- Wetlands of International Importance (listed under the Ramsar Convention)
- Threatened Species and Ecological Communities
- Migratory species protected under international agreements
- Nuclear Actions (including uranium mines)
- Commonwealth Marine Areas
- Great Barrier Reef Marine Park
- A water resource, in relation to a coal seam gas development and large coal mining development
- Commonwealth land.

If an 'activity' is likely to have a significant impact on a MNES then it may be a 'controlled action' and require approval from the Commonwealth Minister for the Environment. As outlined previously, BCM operates under two EPBC approvals 2002/773 and 2012/6637. The EPBC Act approval relevant to the Bulga Surface Operations is EPBC 2012/6637. The referral which informed EPBC 2012/6637 included overburden emplacement on the land that will be impacted by the revised EEA. Therefore, no further EPBC Act approval is required for the proposed modification with the works to be undertaken being in accordance with the scope of the existing EPBC approval 2012/6637 and its conditions.

Relevantly condition 1 of EPBC 2012/6637 states:

1. *The approval holder must not clear more than 611 ha of native woodland vegetation*

As outlined further in **Section 6.6**, the proposed modification will not result in a net increase to impacts on native woodland vegetation. Accordingly, the proposed modification can be undertaken in accordance with this condition.

5.2 New South Wales Legislation

5.2.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

It is proposed to modify the Development Consent (SSD 4960) pursuant to Section 96(2) of the EP&A Act. As a State Significant Development, the Minister for Planning is the consent authority for the modification application, however, with the current ministerial delegations the modification application will be determined by DP&E or the NSW Planning and Assessment Commission.

Modifications sought under Section 96(2) must be substantially the same development for which the original consent was granted. The proposed modification is considered to be substantially the same development as that approved under SSD 4960 as:

- the overall nature, scale and duration of the development remains unchanged
- there is no change in production limits
- the majority of the development remains unchanged from that which is approved as outlined in **Table 3.1**
- the proposed modification does not increase the volume of overburden to be emplaced at the EEA or the duration of activity at the EEA, it simply changes the design of part of the emplacement area
- the volume of tailings to be disposed of is unchanged, with the revised strategy simply adding another in pit tailings emplacement area due to the existence of constraints which inhibit the disposal of tailings underground
- as outlined in **Section 6.0**, there are no substantive changes to environmental impacts as a result of the proposed modification.

Furthermore, consultation with DP&E confirmed that Section 96(2) of the EP&A Act is the appropriate approval pathway for the proposed modification (refer to the letter from DP&E in **Appendix 3**).

Permissibility

The Bulga Surface Operations, including the additional land subject to the proposed modification, is located wholly within the area to which the Singleton Local Environment Plan 2013 (LEP) applies. The land on which the revised EEA and proposed in pit tailings emplacement area are located is zoned RU1 – Primary Production and in accordance with the Singleton LEP open cut mining is permissible with consent.

5.2.2 Mining Act 1992

Under the *Mining Act 1992 (Mining Act)* a Mining Lease is required before any mining or specified mining purpose can be carried out on the land. All of the land on which mining and associated activities will occur is covered by a current mining lease except for the area of the additional land to be used for the revised EEA. As such, a Mining Lease will be required over this land for the proposed modification. BCM has submitted a Mining Lease Application that is currently being considered by the NSW Government.

As the revised EEA will be constructed on land that is not currently subject to a mining lease, the gateway process needs to be considered in regard to the proposed modification. The gateway process applies for projects requiring a new mining lease that are located within Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CIC) (as defined by the regional mapping presented in the Upper Hunter SRLUP) outside of existing mining lease areas. No areas of CIC occur within the area for which a mining lease is required. As outlined further in **Section 6.5**, a site verification certificate process was completed and confirmed land within the alternative disturbance area is not BSAL. Therefore the gateway process is not required to be followed for the proposed modification.

5.2.3 Approvals Required Under Other State Legislation

If the proposed modification is approved under Section 96 (2) of the EP&A Act, the following approvals outlined in **Table 5.1** will also be required

Table 5.1 Environmental Approvals Required for Proposed Modification

Act	Approval	Authority
<i>Mine Subsidence Compensation Act 1961</i>	An approval under section 15 for development within a mine subsidence district.	NSW Mine Subsidence Board (MSB)
<i>Mining Act 1992</i>	A new mining lease is required for part of the revised EEA. A Mining Operations Plan will also be required to be approved under this Act.	Department of Industry - Division of Resources and Energy (DRE)
<i>Protection of the Environment Operations Act 1997 (POEO Act)</i>	BCMs existing Environment Protection Licence (EPL) No. 563 will require a variation to the premises boundary to reflect the changes in the project area associated with the proposed modification.	NSW Environment Protection Authority (EPA)

5.2.4 Environmental Planning Instruments

5.2.4.1 Singleton Local Environmental Plan 2013

The proposed modification is located within the Singleton local government area (LGA) and is subject to the Singleton LEP. As discussed in **Section 5.2.1**, the proposed modification is within the RU1 Primary Production zone. The objectives of this zone are as follows:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

The proposed modification is considered to be consistent with the objectives of the Primary Production zoning as:

- the revised EEA will be located further away from nearby receivers thus minimising potential conflict with other land uses and zones
- there is no net increase in the total disturbance area for the Bulga Surface Operations
- through the agreements reached between BCM and the Mushroom Composters, the revised EEA and the Stage 1 Mushroom Composting Facility will coexist, avoiding land use conflict.

5.2.4.2 State Environmental Planning Policies

The following State Environmental Planning Policies are relevant to the consideration of the proposed modification.

State Environmental Planning Policy – (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP)

The Mining SEPP regulates the permissibility and assessment requirements for mining, petroleum production and extractive industries and related development.

Part 3 of the Mining SEPP requires specific matters to be considered in relation to development applications for mining development or applications that will affect existing or proposed mining operations. Clause 12AB of the Mining SEPP identifies non discretionary development standards for mining and provides that the consent authority cannot impose more onerous standards in any approval in relation to the matters covered by the development standard. The prescribed criteria are summarised in **Table 5.2**, with the relevant assessment outcomes noted for each criteria.

Table 5.2 Non-discretionary development standards for mining under the Mining SEPP

Matter	Non-discretionary Standard	Assessment Outcomes
Cumulative noise level	The development does not result in cumulative amenity noise level greater than the acceptable noise levels, as determined in accordance with Table 2.1 of the Industrial Noise Policy, for residences that are private dwellings	The noise assessment determined that the revised EEA would not result in relevant noise criteria being exceeded.
Cumulative air quality level	The development does not result in a cumulative annual average level greater than 30 µg/m ³ of PM ₁₀ for private dwellings	The air quality assessment determined that the revised EEA would not result in the relevant criteria being exceeded.
Airblast overpressure	Airblast overpressure caused by the development does not exceed: (a) 120 dB (Lin Peak) at any time (b) 115 dB (Lin Peak) for more than 5% of the total number of blasts over any period of 12 months measured at any private dwelling or sensitive receiver.	No changes to blasting are proposed as part of the proposed modification.
Ground vibration	Ground vibration caused by the development does not exceed: (a) 10 mm/sec (peak particle velocity) at any time (b) 5 mm/sec (peak particle velocity) for more than 5% of the total number of blasts over any period of 12 months measured at any private dwelling or sensitive receiver	No changes to blasting are proposed as part of the proposed modification.

Matter	Non-discretionary Standard	Assessment Outcomes
Aquifer interference	Any interference with an aquifer caused by the development does not exceed the respective water table, water pressure and water quality requirements specified for item 1 in columns 2, 3 and 4 of Table 1 of the Aquifer Interference Policy for each relevant water source listed in column 1 of that Table	No aquifers will be intersected as part of the proposed modification. The design of the in pit tailings emplacement facility will provide for recovery of tailings water seepage and is not expected to change the overall predicted groundwater impacts of the Bulga Surface Operations.

Gateway Process

Part 4AA of the Mining SEPP, together with Clause 50A of the EP&A Regulation, provides for the implementation of the NSW Government's Strategic Regional Land Use Plan (SRLUP). The gateway process applies for Projects requiring a new mining lease that are located within Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CIC) (as defined by the regional mapping presented in the Upper Hunter SRLUP) outside of existing mining lease areas.

As discussed in **Section 5.2.2**, a new mining lease is required for part of the area to be occupied by the revised EEA. An assessment of this area was undertaken in accordance with the requirements of the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (NSW Government, 2013). Based on this detailed assessment, it has been determined that there is no BSAL located within the areas requiring a new mining lease as part of the proposed modification. In June 2016 BCM lodged a site verification certificate application for this area to confirm that DP&E concur that no BSAL occurs. No areas of CIC occur with the area over which a new mining lease is required.

As no areas of BSAL or CIC occur within the area over which a new mining lease is required, the gateway process does not apply to the proposed modification.

State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44)

SEPP 44 restricts a Council from granting development consent for proposals on land identified as core koala habitat without preparation of a plan of management. Singleton LGA is listed in Schedule 1 of SEPP 44 and therefore the SEPP 44 needs to be considered in regard to the proposed modification.

An ecological assessment (refer to **Section 6.6**) has been conducted for the proposed modification. The alternative disturbance area for the revised EEA does not provide core koala habitat. Consequently, no further consideration of SEPP 44 is required.

State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33)

SEPP 33 provides for the strategic assessment of major hazardous and offensive developments in the State. The proposed modification does not constitute a hazardous or offensive development and accordingly a preliminary hazard analysis is not required.

State Environmental Planning Policy 55 – Remediation of Land (SEPP 55)

SEPP 55 aims to provide a state-wide planning approach to the remediation of contaminated land and to reduce the risk of harm to human health and the environment by consideration of contaminated land as part of the planning process. Under SEPP 55, a consent authority must not consent to the carrying out of development on land unless it has considered any potential contamination issues. A review of the contaminated land register undertaken for the SEE confirmed that there are no known or registered contamination sites with the alternative disturbance area.

6.0 Environmental Assessment

The BOP EIS (Umwelt, 2013a) assessed the environmental impacts of the originally proposed Bulga Optimisation Project which as discussed in **Section 1.1**, included an out-of-pit emplacement area in the area now proposed to be occupied by the revised EEA. The revised EEA design is wholly within the footprint of the study area and disturbance area for the BOP EIS. Additionally, the proposed modification includes the in pit tailings storage facility which will be located in the existing Main Pit (i.e. within a disturbed mining area). As a result, the environmental and social impacts associated with the proposed modification are well understood. As detailed within **Section 3.0**, the majority of the Bulga Surface Operations will not change as a result of the proposed modification, with the key issues requiring assessment related to the revised design of the EEA and the proposed in pit tailings storage facility. The proposed modification will not result in changes to the approved overburden or coal extraction rates nor will the total volume of tailings increase. There will be no changes to blasting associated with the proposed modification.

The overburden relating to the revised EEA will be emplaced on the land surface and not intersect groundwater. The proposed in pit tailings storage facility will be located within the confines of the existing Main Pit *in situ* void. The BCC open cut and underground mines create a regional depressurisation of the hydrogeological regime within the intersected coal bearing strata which, combined with the design of the tailings facility to recover tailings water, reduces the interaction of the proposed tailings emplacement facility with groundwater. It is also noted that the approved mining operations currently involve in pit tailings and reject emplacement. Therefore, the proposed tailings emplacement activities are consistent with those currently approved. Accordingly the proposed modification is not predicted to change the nature of the existing and approved interactions with groundwater.

Table 6.1 identifies the environmental and social issues potentially relevant to the proposed modification and assesses whether or not a detailed assessment is required for these issues as part of this SEE.

Table 6.1 Screening Assessment of Environmental and Social Issues

Issue	Comments	Assessment Approach
Air Quality	The change in design of the EEA has the potential to change the air quality impacts of the Bulga Surface Operations.	Refer to Section 6.1 .
Noise	The change in design of the EEA has the potential to change the noise impacts of the Bulga Surface Operations.	Refer to Section 6.2 .
Blasting (vibration and overpressure and Blast fume)	No change to blasting proposed.	No further assessment required.
Surface Water	The change in design of the EEA has the potential to change the noise impacts of the Bulga Surface Operations.	Refer to Section 6.3 .

Issue	Comments	Assessment Approach
Groundwater	Modification will not alter the location, scale or timing of excavations, while the tailings storage facility will be hydraulically contained within depressurised strata of the existing operations. Decant water recovered from the tailing will be reticulated back into the IWMS. Accordingly, there are not predicted to be impacts on groundwater outside of those associated with the existing approved development.	No further assessment required.
Aboriginal Cultural Heritage	The alternative disturbance area occurs within the BOP EIS assessment area and has been subject to previous assessment, however, an updated assessment has been provided.	Refer to Section 6.4 .
Historic Heritage	Alternative disturbance area subject to detailed survey. No historic heritage items located in proposed modification area.	No further assessment required.
Soils and Land Capability	The alternative disturbance area occurs within the BOP EIS assessment area and has been subject to previous assessment, however, an updated assessment has been provided.	Refer to Section 6.5 .
Ecology	The alternative disturbance area occurs within the BOP EIS assessment area and has been subject to previous assessment, however, an updated assessment has been provided.	Refer to Section 6.6 .
Chemicals, hazardous substances and dangerous goods.	No change to handling of hazardous substances or dangerous goods proposed.	No further assessment required.
Traffic and Transport	No changes to road or traffic proposed as part of the modification.	No further assessment required.
Bushfire	Proposed modification will not increase bushfire risk. No new structures proposed which would require assessment of asset protection requirements.	No further assessment required.
Waste	No change to waste management (other than physical location of emplacement activities) relative to existing approved development.	No further assessment required.
Public Safety	The proposed modification will not change hazardous materials storage or use or blasting operations and accordingly no changes in impacts predicted.	No further assessment required.

Issue	Comments	Assessment Approach
Economic	The proposed modification will result in an economic benefit to the proponent through reduced capital expenditure requirements but is not predicted to change the overall economic benefits of the Bulga Surface Operations.	No further assessment required.
Greenhouse Gases	The proposed modification will result in negligible changes to greenhouse gas emissions.	No further assessment required.
Visual	The EEA is visible from Broke Road and surrounding areas and therefore an assessment of the change in design as it relates to visual impact has been undertaken.	Refer to Section 6.7 .
Social	The proposed modification is unlikely to have any observable changes in impact for the local community.	Refer to Section 6.8 .
Rehabilitation and Mine Closure	Rehabilitation to be undertaken consistent with the approved rehabilitation strategy with a revised conceptual final landform. No changes to rehabilitation practices are proposed.	Refer to conceptual final landform on Figure 2.7 .

The key environmental and social issues for the proposed modification are considered to be:

- air quality
- noise
- surface water
- Aboriginal cultural heritage
- ecology
- social issues.

6.1 Air Quality

An air quality assessment has been undertaken by Jacobs Group (Australia) Pty Ltd (Jacobs) for the proposed modification. A summary of the key findings of the air quality assessment is provided in this section with the full report included in **Appendix 4**.

6.1.1 Existing Air Quality Practices

BCM has implemented a comprehensive air quality management system to minimise dust generation from its operations. The implementation of this system is guided by the approved Dust Management Plan and includes a wide range of controls supported by dust monitoring cameras and real-time dust monitors which report directly to operational personnel.

In addition to these air quality management controls, BCM has established a Technical Review Committee (TRC) in accordance with Condition 20 of Schedule 3 of SSD 4960 to assist in the development of the EEAMF which addresses the potential air quality impacts on the Stage 1 mushroom composting facility associated with the construction of the EEA. The EEAMF includes the establishment of a PM₁₀ assessment level and a Trigger, Action, Response Plan to assist BCM manage the potential air quality impacts on the Stage 1 Mushroom Composting Facility.

6.1.2 Assessment Methodology

The Air Quality Assessment of the proposed modification has been undertaken by Jacobs Pty Ltd in accordance with the 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW' (DEC 2005). This modelling approach is accepted by the NSW Environment Protection Agency (EPA) and DP&E.

The assessment of potential air quality impacts as a result of the proposed modification included:

- Estimating and comparing dust emissions from two scenarios, namely BCC without the proposed modification, and BCC with the proposed modification. The emission calculations for both of these scenarios considered the current emissions inventory refinements completed by the TRC. The worst case year in terms of potential dust emissions was selected. Emissions were estimated for both Year 3 and 4. Year 3 estimates were found to be higher, due to the material handling quantities, and so were used for the assessment.
- Running an air dispersion model, CALPUFF, for the BCC, without and with the proposed modification to predict potential impacts at the Stage 1 mushroom composting facility and nearby residential receivers to the north and northeast of the revised EEA.

The air quality modelling included background levels incorporated from the following sources:

- obtaining data from the OEH's Mt Thorley monitoring site for 2014
- predicting the contribution of the 2014 activities at BCC to monitored PM₁₀ concentrations at the Mt Thorley site
- subtracting the predicted contribution of the BCC from the monitoring data
- adding the derived Mt Thorley background (less the existing BCC contribution) to the model predictions for future operations.

The proposed modification would not increase the production rates or overburden emplacement volumes to that currently approved, rather the location of the EEA will change only. Accordingly the air quality impact assessment focussed on the nearest sensitive receivers located to the North and North West on Mitchell Line of Road as they had the highest potential for any change in impact.

6.1.3 Air Quality Criteria

The relevant air quality criteria are included in Condition 16 of Schedule 3 of SSD 4960 as the air quality criteria to be met by the BCC. In addition, the TRC, as part of the process for addressing Condition 19 of Schedule 3 of SSD 4960, established a PM₁₀ assessment level specifically for the Stage 1 mushroom composting facility. **Table 6.2** identifies the relevant criteria.

Table 6.2 Relevant Air Quality Criteria

Air Quality Indicator	Averaging Time	Criterion	Notes
Particulate Matter (PM ₁₀)	24-hour	50 µg/m ³	EPA. Applies to sensitive receptors.
	Annual	30 µg/m ³	EPA. Applies to sensitive receptors.
Particulate Matter (PM ₁₀) at the Stage 1 mushroom composting facility	13 hour (6 am to 7 pm)	91 µg/m ³	TRC. Applies to the Stage 1 mushroom composting facility only.

6.1.4 Air Quality Impact Assessment

The air quality impact assessment of the proposed modification concluded that emissions as a result of the proposed modification are likely to be lower than emissions with the approved EEA. This is due to the proposed modification having slightly shorter haul routes and a smaller extent of disturbed area. Therefore, the proposed modification will not increase off-site air quality impacts over those for the currently approved operation (refer to **Appendix 4**).

6.1.4.1 Potential Impacts on Stage 1 Mushroom Composting Facility

The CALPUFF dispersion model was used to predict PM₁₀ concentrations, with the model predictions compared with the air quality criteria established for the Stage 1 mushroom composting facility by the TRC. **Table 6.3** provides the air quality modelling results.

Table 6.3 Predicted PM₁₀ concentration for the Stage 1 mushroom composting facility

Scenario	Year 3 "Approved"	Year 3 "Proposed"
Predicted maximum 24 – hour average* PM₁₀ concentration, including background levels (ug/m³) – Criteria of 91 µg/m³		
Emplacement to EEA North / East	64	66
Emplacement to EEA West	65	65
Emplacement to EEA South	72	72
Predicted number of days* per year above 91 µg/m³ (13hr TWA), including background levels		
Emplacement to EEA North / East	0	0
Emplacement to EEA West	0	0

Scenario	Year 3 "Approved"	Year 3 "Proposed"
Emplacement to EEA South	0	0

* BCC contribution is for a 13-hour period, between 6 am to 7 pm. Refer to Figure 1.3 for the location of northeast and south areas of EEA

Based on the results in **Table 6.3** it is concluded that the proposed modification will not materially change the air quality conditions at the Stage 1 mushroom composting facility compared to the currently approved activities. The Stage 1 mushroom composting facility assessment criteria of 91 ug/m³ will not be exceeded as a result of the proposed modification.

6.1.5 Potential Impacts on Sensitive Receivers

A comparison of the model predictions for the proposed modification and the approved Bulga Surface Operations against the air quality criteria described in **Table 6.2** are provided in **Table 6.4**. The model predictions for maximum 24-hour average PM₁₀ concentrations and days above the air quality criteria of 50 ug/m³ are included within **Table 6.4** below.

Table 6.4 Predicted PM₁₀ emissions for private properties north of the EEA

Private Residence	Approved Bulga Surface Operations (Year 4)	Prediction for Year 3 as proposed (with EEA modification)	Criteria
Predicted maximum 24 hour average PM₁₀ concentration (BCC contribution only) (µg/m³)			
1A	32	19	50 (Note, this is a cumulative criteria. It is provided for reference only).
3	36	22	
8	30	25	
323	32	20	
324	27	19	
325	23	17	
Predicted number of days per year above 50 µg/m³ (cumulative)			
1A	20	3	5 (NEPM)
3	17	3	
8	15*	4	
323	15	3	
324	15*	3	
325	15*	3	

Private Residence	Approved Bulga Surface Operations (Year 4)	Prediction for Year 3 as proposed (with EEA modification)	Criteria
Predicted annual average PM ₁₀ concentration (cumulative) (µg/m ³)			
1A	29	21	30
3	17	21	
8	17	22	
323	16	21	
324	15	20	
325	14	20	

Notes: The approved project assessment used Year 4 for the air quality assessment. As Year 3 of the proposed modification is now considered worst case for the revised EEA, it has been used in this assessment.

* Estimated. Results not available for this location in the Bulga Optimisation Project Revised Project Report.

Based on the results of the modelling undertaken, the proposed EEA design will not materially change the air quality conditions at the nearest properties to the north of the EEA compared to the currently approved activities and the air quality impact assessment criteria can be achieved.

It can be seen from **Table 6.4** that predictions from the Revised Project Report have been compared to predictions from an updated model of BCC which includes the proposed modified EEA. The updated model includes model refinements completed by the TRC, as required by air quality conditions in SSD 4960, and shows less spatial variation in annual PM₁₀ than the Revised Project Report. This outcome is more consistent with the local monitoring data. It should be noted that compliance with the 30 µg/m³ criterion at all receivers is predicted by both models.

Given the results above, it is considered that there would be no material change on the air quality impacts for all other residences within proximity to the BCC including those to the south and west.

6.1.6 Air Quality Monitoring and Management

There are no changes to the proposed air quality monitoring locations or air quality management measures as a result of the proposed modification. Air quality monitoring and management controls will be implemented in accordance with the existing management practices utilised by BCM and as required by development consent SSD 4960.

6.2 Noise

A noise impact assessment (NIA) has been undertaken by Global Acoustics for the proposed modification. A summary of the key findings of the noise impact assessment is provided in this section with the full report included within **Appendix 5**.

6.2.1 Noise Assessment Methodology

The NIA for the BOP EIS (Umwelt, 2013) and the Revised Project was undertaken utilising 5 operational noise scenarios which were modelled to represent the progression of mining operations for day, evening and night periods. Each staged model represented reasonable and feasible worst case operating conditions. The stages were referred to as Year 1, Year 4, Year 7, Year 13 and Year 19.

The noise assessment for the proposed modification has utilised the same mining scenarios as the BOP EIS and the Revised Project Report. As Year 1 has now passed, Year 4, Year 7, Year 13 and Year 19 were included in the assessment for the proposed modification. It is important to note that unlike the air quality assessment, the noise impact assessment included the modelling for all remaining years even though activities associated with the revised EEA will be primarily undertaken during the Year 4 model scenario. The change in location of the EEA would result in a change in topography which in turn can impact on the noise propagation in the vicinity of the EEA. Accordingly, to enable potential noise impacts at the small number of sensitive receivers located on Mitchell Line of Road the change in topography for Years 4, 7, 13 and 19 were modelled.

Noise levels were predicted using RTA Technology's Environmental Noise Model (ENM), a computer based environmental noise model, to determine the noise impact of the proposed modification. For consistency with previous assessments, results were determined using the cumulative distribution of results methodology. Model predictions presented are 90th percentile levels for the worst case season.

6.2.2 Noise Criteria

SSD-4960 includes the noise criteria for residences on privately owned land. The noise criteria included in Condition 3 of schedule 3 of SSD-4960 is reproduced in **Table 6.5** below.

Table 6.5 Noise Criteria from SSD-4960

Location	Day L_{Aeq} (15 min)	Evening L_{Aeq} (15 min)	Night L_{Aeq} (15 min)	Night $LA1$ (1 min)
1A, 8	38	38	38	45
97	38	38	36	45
217n, 230, 232, 234, 323, 324, 325	37	37	37	45
1B,94,95,103,105A, 105C,142A, 143B, 145,164,165,179,195,217s,217 m,222,226,227,228,229,231,235 ,237,239,240,241,261,262,263,264,265,266,272	36	36	36	45
All other privately owned residences	35	35	35	45

Condition 4 of Schedule 3 of SSD-4960 states that:

At the direction of the Secretary, Table 3 above shall be replaced with the Table in Appendix 6.

Note: This direction will be given following the construction of the proposed noise and visual bund (see the figure in Appendix 2) to a height of 150 m AHD or the start of Year 7 of the development under this consent, whichever occurs sooner.

Table 6 of Appendix 2 of SSD-4960 is reproduced as **Table 6.6**.

Table 6.6 Appendix 6 of SSD-4960 for Noise criteria after Year 7 of the Project or following the establishment of the BOP Noise and Visual Bund

Location	Day L_{Aeq} (15 min)	Evening L_{Aeq} (15 min)	Night L_{Aeq} (15 min)	Night $LA1$ (1 min)
95, 142A, 143B, 164, 165, 195, 217s	36	36	36	45
All other privately owned residences	35	35	35	45

Based on the variable criteria **Table 6.5** and **6.6**, this assessment includes a review against the criteria in **Table 6.5** for Year 4 and **Table 6.6** for years 7, 13 and 19.

6.2.3 Noise Assessment

Receptors located north-east of the EEA have the greatest potential to be impacted as a result of the proposed modification, as the EEA is located generally between the site and these residences. In overview, the NIA found that changes in site noise emissions between the approved Bulga Surface Operation and the Bulga Surface Operations with the proposed modifications are insignificant for all assessed stages of operation, for all receptors. No exceedances of the existing criteria are predicted for any stages at the nearest residences to the revised EEA. The specific noise assessment findings are included below.

6.2.3.1 Operational Noise Assessment

Noise modelling was undertaken for the stages as detailed within **Section 6.2.1**. Model predictions indicate changes in site noise emissions are insignificant for all assessed stage operations for all receptors. Compliance with the noise criteria in SSD 4960 is predicted for all stages. The zone of affectation is predicted to remain relatively unchanged with that of the approved Bulga Surface Operations with any change in noise emissions predicted to be insignificant and imperceptible. The noise modelling undertaken for the proposed modification identified the following for each of the stages.

Year 4

The maximum predicted change to noise emissions compared to the approved Bulga Surface Operations is +/- 1dB. A number of receptors have a predicted increase of 1dB due to the revised EEA design, however none of the receptors are predicted to exceed the development consent criteria. A change of 1 dB is considered imperceptible to the human ear.

Year 7

Year 7 noise emissions for all receptors are predicted to remain in compliance with the development consent criteria. There are predicted to be no increases in noise emissions for any receptors to the west of the site with reductions in noise emissions of 1 dB to 2 dB predicted for receptors to the north east of the BCC.

Year 13

There are predicted to be no increases relative to the approved Bulga Surface Operations for any receptors located west of the revised EEA. Year 13 predictions for all receptors are predicted to remain in compliance with the development consent criteria.

Year 19

There are predicted to be no increases to noise emissions for any receptors located to the west of the EEA. There are predicted increases of 1 dB to 3 dB for receptors to the north east of the EEA, however, all receptors are predicted to remain in compliance with the development consent criteria.

6.2.3.2 Cumulative Noise Assessment

Operational noise predictions indicate minimal change in noise emissions relative to the approved Bulga Surface Operations. No change to cumulative noise levels is therefore expected.

6.2.3.1 Sleep Disturbance

Operational noise predictions indicate minimal change in noise emission relative to the approved Bulga Surface Operations. No change to operational methods at the EEA are proposed, and no change to maximum noise level emissions relative to the approved Bulga Surface Operations are expected to occur and therefore no change in potential impacts related to sleep disturbance.

6.2.3.2 Road Traffic Noise

There is no change to traffic as a result of the proposed modification and therefore there is no predicted change to traffic noise impacts to those of the approved Bulga Surface Operations.

6.2.3.3 Low Frequency Noise

Modelling to determine whether there were any potential changes to low frequency noise emissions as a result of the proposed modification was undertaken for the NIA. All C-weighted predictions, with the exception of receptor 149 which already has voluntary acquisition upon request rights with BCM, are not considered to be likely to cause impact as a result of low frequency noise.

6.2.4 Noise Management and Monitoring

There are no changes to the proposed noise monitoring locations or noise management measures as a result of the proposed modification. Noise monitoring and management controls will be implemented in accordance with the existing management practices utilised by BCM and the requirements of the development consent.

6.3 Surface Water

The BCC is located in the catchment areas of Wollombi Brook and Loders Creek (refer to **Figure 3.1**). Both Wollombi Brook and Loders Creek are tributaries of the Hunter River. The western parts of the BCC are located within the Wollombi Brook catchment area and the eastern parts of the BCC are located within the Loders Creek catchment area.

The proposed modification is located in the eastern parts of the BCC and lies within the Loders Creek catchment area. As such there will be no impacts as a result of the proposed modification on Wollombi Brook or its catchment area.

Loders Creek is a schedule 2 (4th order) ephemeral watercourse and its confluence with the Hunter River lies approximately 5 kilometres downstream of the revised EEA. Loders Creek has one main tributary, Nine Mile Creek. Both Loders Creek and Nine Mile Creek have been highly modified by approved mining activities. The confluence of Nine Mile Creek and Loders Creek lies upstream of the revised EEA.

BCM owns a large portion of the Loders Creek catchment which has been set aside for mining activities and rural / grazing agricultural activities. Some privately owned areas remain including forested and agricultural areas.

The proposed in-pit tailings storage facility to be located in Main Pit will be managed and operated in accordance with the currently approved IWMS that will not require any changes to surface water management systems. Accordingly, no further assessment is required of the tailing storage facility as part of the surface water assessment.

6.3.1 Water Management System

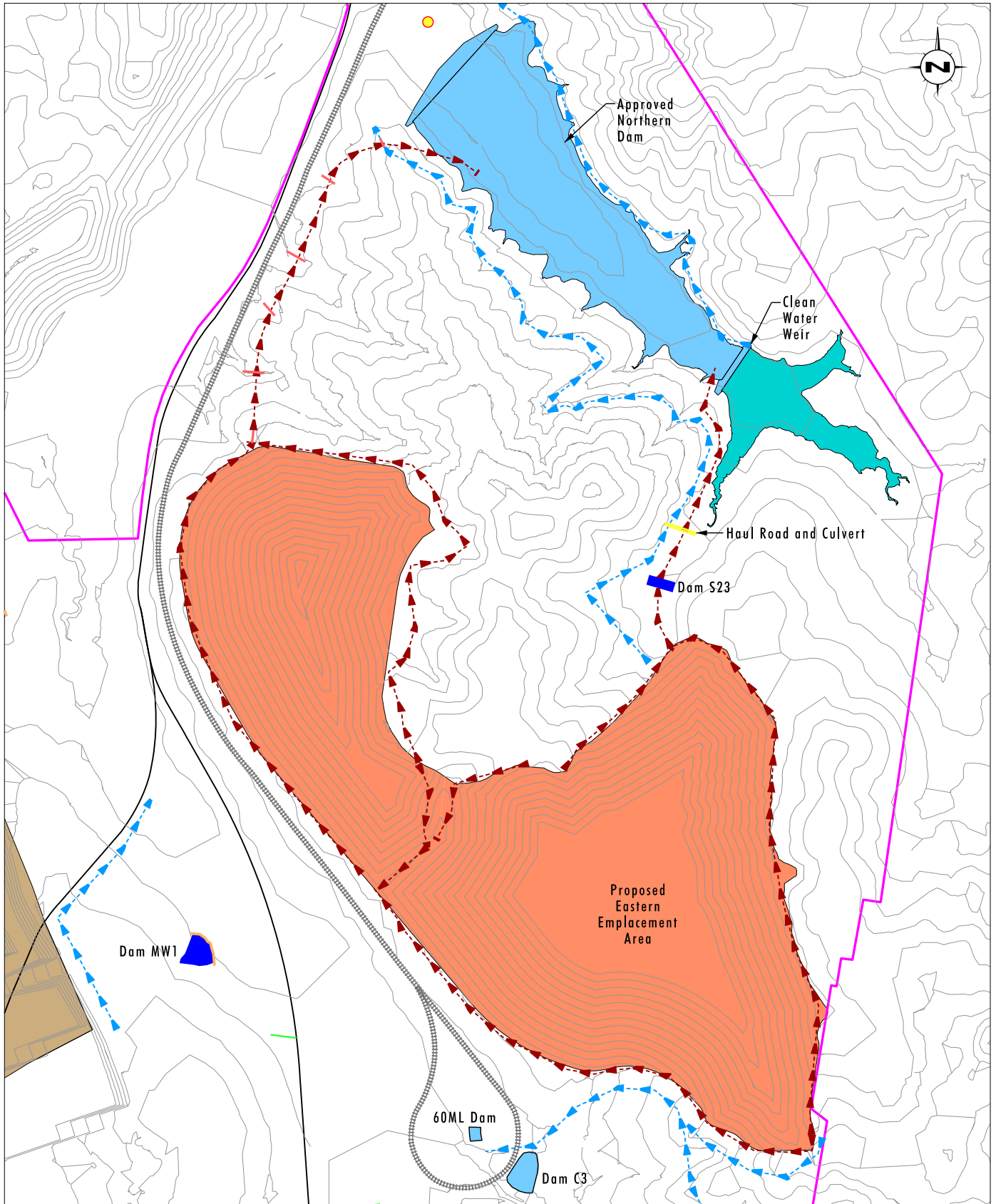
The approved IWMS at the BCC manages water of three distinct types: clean, dirty and mine water. Each type of water requires different management measures to minimise the risk of contamination of downstream drainage systems by construction and mining activities. There are no changes to the approved water management strategy for the BCC required as a result of the proposed modification (i.e. no changes to the approach to management of clean, dirty and mine water with associated design criteria for each component). The approved IWMS strategy is consistent with the requirements of *Managing Urban Stormwater: Soils and Construction* (the Blue Book) - *Volumes 1 and 2E – Mines and Quarries* (Landcom, 2004 and DECC, 2008).

While the general location of the revised EEA will still to be to the north-east of the open cut pit, the revised EEA will result in changes to the layout and size of some components of the IWMS in this area.

The layouts of the key components of the IWMS for the revised EEA are shown on **Figure 6.1**. The conceptual WMS is shown for Year 4 and Year 7 when the revised EEA is active. The maximum extent of the revised EEA is reached in Year 4 and the runoff from will continue to be considered dirty until rehabilitation has been established. It is noted that the timeframes indicated are indicative only for assessment purposes and will ultimately be determined by the mining schedule.

The revised EEA will result in changes to the locations of sediment dams and clean and dirty water drains in the vicinity of the revised EEA. Dirty water runoff from the revised EEA will be managed in sediment dams within the dirty water system. Clean water will be diverted around the revised EEA where practicable. There is an area (approximately 70.2 hectares) of upslope catchment to the immediate east and north of the revised EEA for which it will be impractical to divert clean runoff. This runoff will therefore be managed as part of the dirty water system.

The changes to the WMS are outlined in **Table 6.7**.



Source: BCM (2013), LPMA (2009)
 Note Contour Interval 5m

0 0.25 0.5 1.0 km
 1:20 000

Legend

- | | |
|--|---|
| — Revised Project Area | - - - Clean Water Diversion Drain |
| — Approved BCC Access Roads | - - - Dirty Water Catch Drain |
| ■ Sediment Dam | — Culvert |
| ■ Mine Water Dam | Rail Loop |
| ■ Clean Water Dam | ● Indicative HRSTS Discharge Points |
| ■ Active Overburden | |
| ■ Active Pit | |

FIGURE 6.1

Conceptual Water Management
 at Year 4

Table 6.7 Conceptual IWMS for the revised EEA

Aspect	Indicative Description
Year 4 IWMS for revised EEA	The IWMS will be constructed from the south along with the revised EEA development, with approved and proposed sediment dams being constructed to manage runoff.
Year 7 IWMS for revised EEA	Runoff from the revised EEA will continue to be considered as dirty water until rehabilitation is established. The above controls listed for Year 4 will continue to operate as described above during Year 7.
Years 13 and 19 IWMS for revised EEA	Runoff from the rehabilitated revised EEA will be considered clean water and will be released off site where practicable. The ultimate timing of the release of water offsite will be determined by the timing of successful establishment of rehabilitation and runoff water quality.

One new sediment dam (S23) is proposed as part of the proposed modification (refer to **Figure 6.1**). Dam S23 has a catchment area of approximately 159 hectares. The sediment dam will be designed, consistent other components of the dirty water management system, to meet the requirements of the Blue Book (Landcom, 2004 and DECC, 2008). The proposed sediment dam S23 will act in conjunction with the Northern Dam to manage dirty water runoff from the northern portion of the revised EEA.

6.3.2 Surface Water Impacts

The potential surface water impacts resulting from the proposed modification are assessed in the following sections.

6.3.2.1 Annual Flow Volumes

The revised EEA will impact on the Loders Creek catchment area (refer to **Table 6.8**).

Table 6.8 Predicted Impacts on Catchment Areas

Catchment	Pre-Mining (ha)	Approved Final Landform (ha)		Proposed Modification	
		Year 7 (ha)	Final Landform (ha)	Year 7 (ha)	Final Landform (ha)
Loders Creek (at confluence with Hunter River) ¹	5,958	2,792	5,071	2,722	5,071

1. The Loders Creek catchment area excludes the contribution from Doctors Creek. Doctors Creek joins Loders Creek immediately upstream of the confluence with the Hunter River. The catchment area of Doctors Creek has also been impacted on by mining at Mount Thorley Operations (MTO).

The assessment indicates that, compared to the currently approved EEA,

- Loders Creek catchment will be reduced during the operational period by a maximum of approximately 70 hectares (i.e. 2.5 per cent relative to the existing approved impacts).
- In the Final Landform the impacts on the catchment area of Loders Creek will not be changed as the catchment area will continue to report to Loders Creek.

As such it is considered that the impacts on annual flow volumes will be negligible relative to the approved impacts.

6.3.2.2 Flooding

Analysis of the potential impacts on flooding in Loders Creek associated with the proposed modification have been undertaken using the XPStorm® 1D hydrodynamic flood models of the Loders Creek system (including Nine Mile Creek) for the revised EEA. The results are given in **Table 6.9** for Year 7 (i.e. the maximum IWMS area in the catchment of Loders Creek) as modelled immediately downstream of the Northern Dam.

Table 6.9 Loders Creek – Flood Model Results

Scenario	10 year ARI			20 year ARI			100 year ARI		
	Flow (m ³ /s)	Velocity (m/s)	Depth (m)	Flow (m ³ /s)	Velocity (m/s)	Depth (m)	Flow (m ³ /s)	Velocity (m/s)	Depth (m)
Pre-Mining	89.7	1.09	3.57	109.0	1.09	4.53	151.2	1.09	4.53
Year 7 (Approved Project)	47.4	1.07	2.53	59.8	1.12	3.10	88.7	1.11	3.53
Year 7 (Proposed Modification)	43.2	1.05	2.44	52.8	1.09	2.65	72.4	1.11	3.37

Note: 1) The minimal influence on velocities reported in **Table 6.9** is a result of the modelled flows being out of bank for all storm events.

2) Note that the catchment areas used in the modelling are different to those reported in **Table 6.8**, since the sediment dams are assumed to spill during these more extreme flood events.

The modelling indicates that the proposed modification will not increase peak flows, velocities or flood depths in Loders Creek downstream of the revised EEA.

6.3.2.3 Other Surface Water Impacts

The BOP EIS assesses potential impacts on water quality, base flows, downstream water users, riparian and ecological values of the watercourses, environmental flows, discharges to Loders Creek, and associated erosion and sediment control measures.

The proposed modification is not expected to increase any of the potential impacts on the abovementioned surface water aspects relative to the approved Bulga Surface Operations.

The proposed modification is also assessed to result in negligible impact on the total catchment area of the IWMS for the BCC and as such will have negligible impact on the water balance for the BCC including the previously assessed water imports and discharges over the life of the approved Bulga Surface Operations.

In summary, the Proposed Modification will either have negligible surface water impacts or leave the impact unchanged from the approved impacts.

6.3.3 Surface Water Monitoring and Management

Surface water monitoring requirements are unchanged as a result of the proposed modification. As part of the implementation of the proposed modification, the *Site Water Management Plan* and associated sub plans will be updated to include changes to the IWMS with the revised EEA.

The *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* continues to apply to watercourses and alluvial groundwater in the vicinity of the Project Area and water take continues to be governed by the *Water Management Act 2000*. BCM will licence all water take as required by the provisions of the *Water Management Act 2000*.

Reporting requirements remain unchanged.

6.4 Aboriginal Heritage

An Aboriginal Cultural Heritage Assessment (ACHA) has been undertaken by OzArk for the proposed modification. The ACHA focussed on the alternative disturbance area associated with the revised EEA as there are no other changes that required assessment in regard to Aboriginal cultural heritage. A summary of the key findings of the ACHA is provided in this section with the full report included within **Appendix 6**.

6.4.1 Assessment Approach and Sampling Strategy

The alternative disturbance area was assessed during a field survey conducted in December 2011 with Registered Aboriginal Parties (RAPs) as part of the BOP EIS. A further survey of the alternative disturbance area was undertaken on 12 February 2016 as part of this assessment (Oz Ark, 2016). Two transects were completed as part of the survey. Transect 1 was designed to investigate the southern portion of the alternative disturbance area, an area that was not a major focus of the 2011 BOP survey. Transect 2 was undertaken to provide a cross-section of the northern portion of the alternative disturbance area.

When combined with the areas assessed during the BOP assessment, the alternative disturbance area has had all constituent landforms and all ephemeral waterways assessed. The 2016 survey and the Eastern Emplacement Archaeological Assessment (Oz Ark, 2016) was conducted in accordance with the Code of Practice for the Investigation of Aboriginal Objects in New South Wales (Code of Practice, DECCW 2010), refer to **Figure 6.2**.

6.4.2 Consultation Process

The survey methodology for 2016 survey was provided to all RAP's registered for the Bulga Optimisation Project including the Wannaruah Local Aboriginal Lands Council and the four Aboriginal field work service providers being Wannarua Nation Aboriginal Corporation, Tocomwall Pty Ltd (representing Plains Clans of the Wannarua People (Registered NT Claimant Group)), Hunter Valley Aboriginal Corporation and Wannarua Traditional Custodians. The survey methodology utilised for the assessment for the proposed modification was consistent with the methodology utilised for the BOP EIS surveys.

Wonnarua Nation Aboriginal Corporation, Tocomwall Pty Ltd, Hunter Valley Aboriginal Corporation and Wonnarua Traditional Custodians were contacted by OzArk on 10 February on behalf of BCM to request attendance at the survey. Hunter Valley Aboriginal Corporation and Tocomwall Pty Ltd attended the field survey on 12 February 2016.

6.4.3 Scientific (Archaeological) Significance

The alternative disturbance area comprises two known sites, BOP OS-2 (AHIMS #37-6-2836) an artefact scatter and BOP SC-3 (AHIMS #37-6-2847) a site complex. Both BOP OS-2 and BOP SC-3 were recorded by OzArk in 2012 as a result of the *Aboriginal Archaeological Values Assessment for the Bulga Optimisation Project* (OzArk 2012), refer to **Figure 6.3**. The southern portion of BOP SC-3 was within the area of approved disturbance in accordance with SSD 4960 and was salvaged during the BOP salvage program in 2015. BOP OS-2 and BOP SC-3 were assessed as having low significance due to the low density of artefacts recorded at the two sites and the existing levels of disturbance from agricultural land use and erosion (OzArk, 2012).

During the 2016 survey for the proposed modification, one previously unrecorded Aboriginal site (BOP IF-8) was recorded refer to **Figure 6.3**. BOP IF-8 is an isolated find consisting of an isolated mudstone flake and was recorded within the in-stream channel of a drainage line. It was assessed that BOP IF-8 is not associated with further, intact, archaeological deposits.

The scientific significance assessment of BOP SC-3 and BOP OS-2 has been taken from the previous Oz Ark assessment with the scientific significance of BOP IF-8 determined as part of the current assessment. The scientific significance of the sites is detailed in **Table 6.10** below and is considered to be low for the site within the footprint of the revised EEA.

Table 6.10 BOP OS-2, BOP SC-3, BOP IF-8 Scientific Significance Assessment

Site Name	Source	Scientific significance	Scientific Background
BOP OS-2	Oz Ark, 2012	Low	Site occupies a ridge line that may have been used for transit in the past. Site represents an eroded surface scatter with a low density of artefacts. The site has undergone impacts from agricultural land use and erosion.
BOP SC-3	Oz Ark, 2012	Low	Low densities of artefacts recorded in several exposures. BOP SC-3 displays a low density of artefacts and a low site complexity. Thin A Horizon soils. Localised disturbance from erosion extensive in some areas.
BOP IF-8	Oz Ark, 2016	Low	The isolated find consisted of an isolated mudstone flake and was recorded within the in-stream channel of a drainage line.

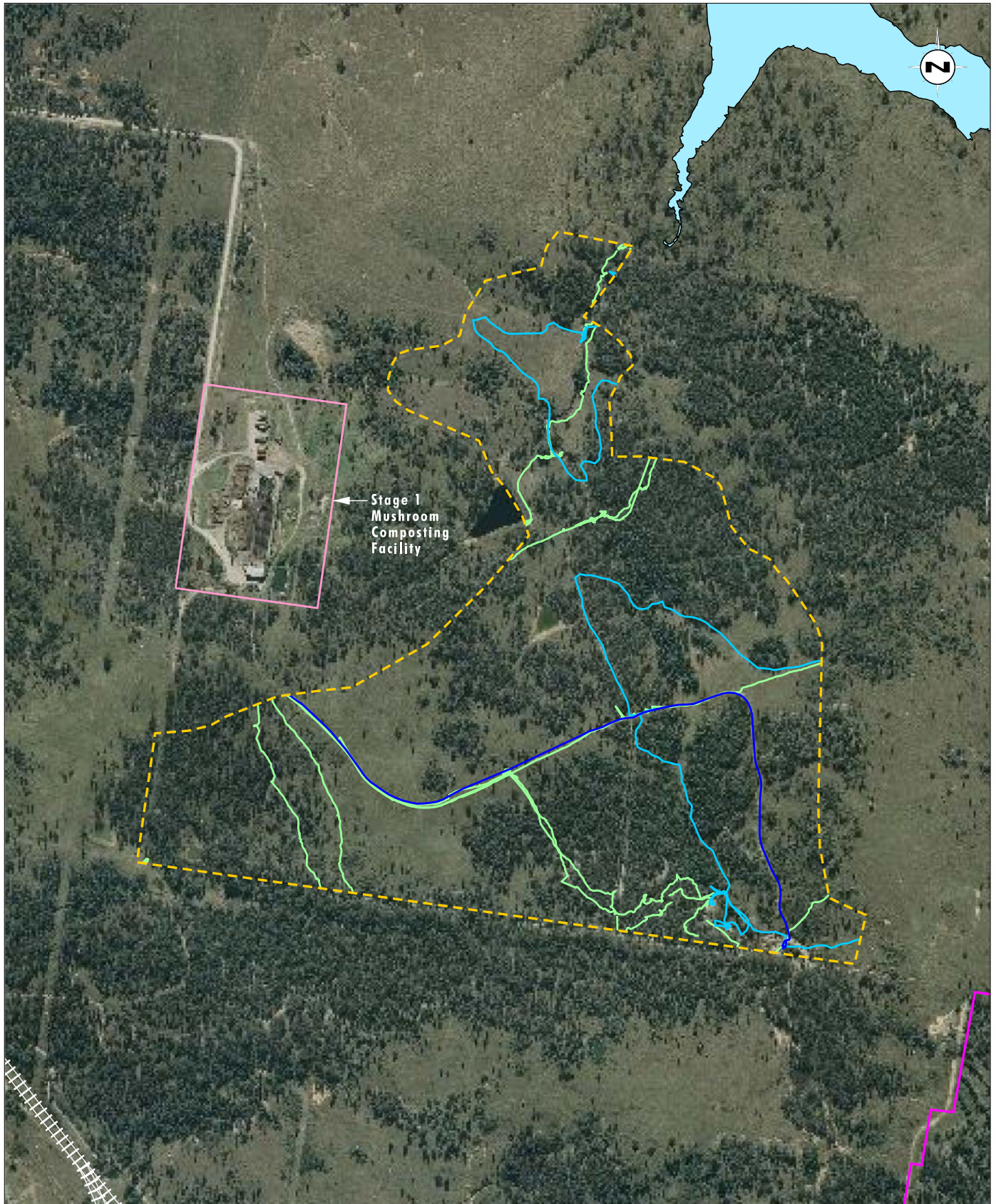


Image Source: AAM Hatch Pty Limited (March 2012), BCM (2013)
 Data Source: BCM (2013), OzArk (2016)

0 100 250 500m
 1:10 000

Legend

- Revised Project Area
- Additional Disturbance Area
- Approved Northern Dam
- Stage 1 Mushroom Composting Facility
- BOP Survey Trabsect 2011 - 2012
- Survey 2016
- Survey 2016 - Vehicle

FIGURE 6.2

Archaeological Survey Effort

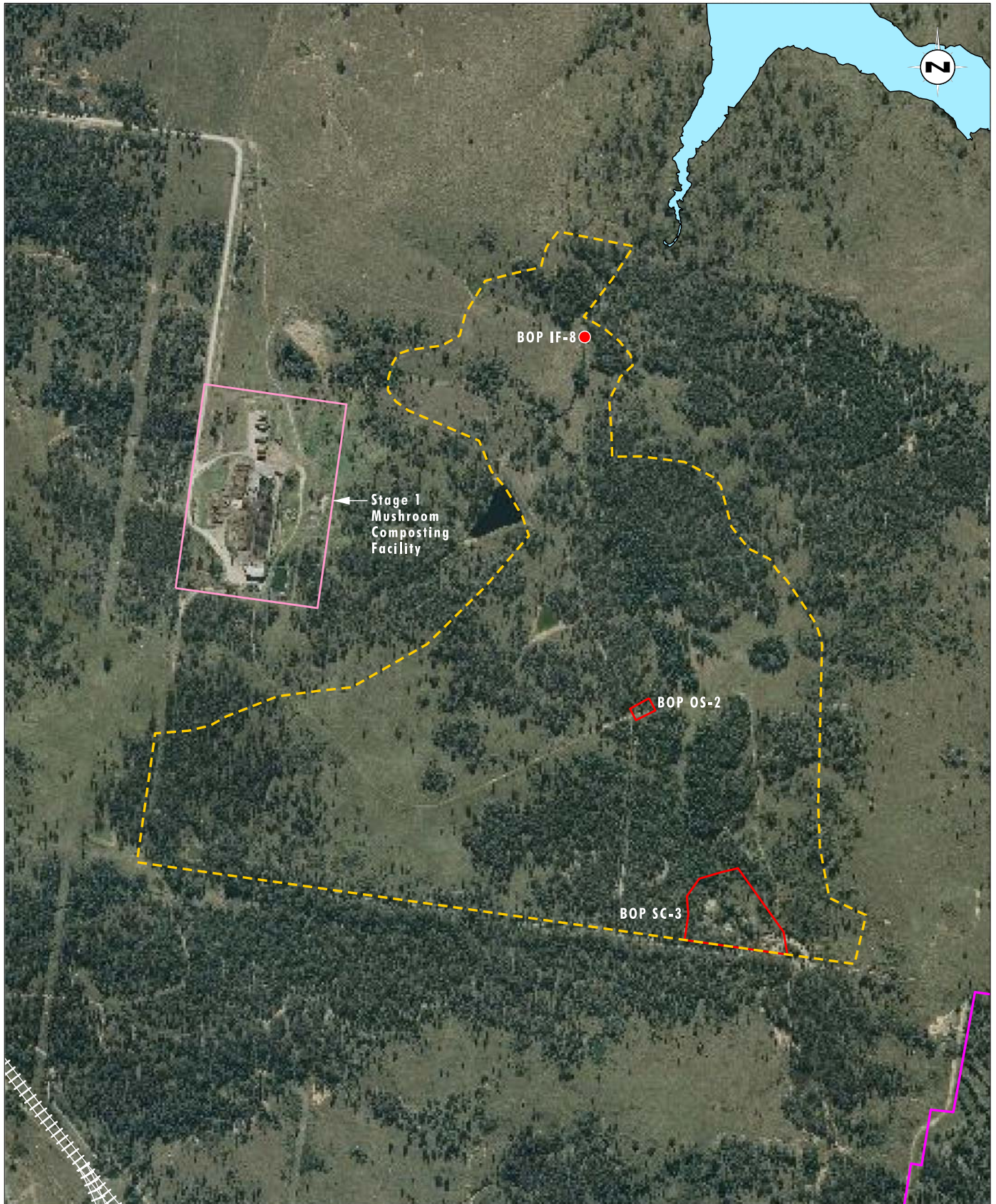


Image Source: AAM Hatch Pty Limited (March 2012), BCM (2013)
 Data Source: BCM (2013), OzArk (2016)

0 100 250 500m
 1:10 000

Legend

- Revised Project Area
- Additional Disturbance Area
- Approved Northern Dam
- Stage 1 Mushroom Composting Facility

FIGURE 6.3

Location of Archaeological Sites

6.4.4 Aboriginal Cultural Heritage Impact Assessment

The BOP EIS included the following regarding the cultural connections to the BOP Project Area, of which the alternative disturbance area is a part:

The RAPS consulted for the (BOP) Aboriginal Cultural Heritage Assessment (ACHA) identified a range of cultural values and attachments to the (BOP) Project Area and the broader region, ranging from traditional connection to the area, historical attachments, connection to the traditional homelands (Country), connection to the community, and reconnecting attachments.

In identifying their cultural values of place, some RAPS focused on the significance of the (BOP) Project Area as a whole, rather than the individual places and objects, stating that the (BOP) Project Area and all components within it and external to it can only be understood as part of a larger cultural landscape defined by its cultural, spiritual and social connectivity.

...RAPS identified the (BOP) Project Area to be of high social, cultural and spiritual significance to Traditional Owners and Knowledge Holders and other RAPS, because it has spiritual and ceremonial associations to extremely high value sacred Creation and ceremonial places within the region"

Given the alternative disturbance area was previously assessed in detail, for the purposes of this assessment it has been assumed that the high cultural significance identified by the RAPS remains for the alternative disturbance area.

The site type recorded during the survey and the previously recorded sites within the alternative disturbance area, namely isolated finds and artefact scatters, accord with the predictive model set out in **Appendix 6**. The absence of other sites such as scarred trees is due to a lack of endemic trees of sufficient age for Aboriginal cultural scarring throughout the alternative disturbance area as a result of historic land clearance. The absence of hearths and grinding grooves is expected given the level of past disturbance and the absence of suitable rock outcropping respectively.

No archaeologically sensitive landforms were recorded during the current assessment or the previous survey of the land within the alternative disturbance area. Ground Surface Visibility (GSV) was generally low across the alternative disturbance area with areas of exposure afforded by access tracks and areas subject to erosion. The most likely explanation for the lack of discernible archaeological material in the alternative disturbance area is the types of landforms (in the majority sloping landforms), the lack of permanent water sources and degree of land-use disturbances linked to vegetation clearance, grazing and erosion.

The absence of artefacts at BOP OS-2 during the current survey can be attributed to the low number of artefacts previously recorded at the site and the level of disturbance arising from water movement on the access track on which the site is located. Artefacts were present at BOP SC-3 during the current assessment; however since the site's recording in 2011, the recorded artefacts are likely to have been further displaced by sheet wash erosion.

6.4.5 Aboriginal Cultural Heritage Management Measures

As impacts to BOP IF-8, BOP OS-2 and BOP SC-3 are unavoidable by the construction of the revised EEA and associated activities, all surface artefacts are proposed to be collected for safe-keeping. The collection process will be undertaken under a revised Bulga Coal Complex ACHMP and follow the requirements of the 'Category 3' salvage process described in **Appendix 6**.

At BOP OS-2 no surface artefacts were visible at the time of the 2016 inspection. Salvage of this site is proposed to be undertaken, although it may be necessary to use shovels/trowels to remove accumulated silts from the road to fully determine if the recorded artefacts remain within the site boundary.

Outside of BOP IF-8, BOP OS-2 and BOP SC-3 there are no constraints to the proposed work, however, the following management measures will be put in place:

- a. The proposed works will stay within the assessed area. If the works are required to deviate from the assessed area then further archaeological assessments may be required.
- b. Should any items be noted during the proposed work that are suspected to be of Aboriginal origin, then work in the immediate area will cease and the advice from a suitably qualified archaeologist will be sought to assess the nature of the find and to suggest an appropriate path forward. Protocols contained in the Bulga Coal Complex ACHMP (BUL SD PLN 0046) will be followed.

This information was provided to the RAPs for a period of 28 days commencing on 23 March 2016. Of the RAPs who responded, no specific comments were provided on the proposed management measures.

6.5 Soil and Land Capability Assessment

A soil land capability assessment was prepared with a focus on Biophysical Strategic Agricultural Land Assessment (BSAL). This assessment was focussed in the alternative disturbance area and has been undertaken to verify if there is any BSAL within the alternative disturbance area (SLR, 2016) (refer to **Appendix 7**). The study area for the BSAL assessment (BSAL study area) included the alternative disturbance area in addition to a 100 metre buffer, which resulted in the assessment of approximately 160 hectares of land, refer to **Figure 6.4**.

A preliminary desktop assessment found the BSAL study area is covered by the Rothbury Soil Landscape Unit (Kovac and Lawrie, 1991), which is dominated by the Australia Soil Classification (ASC) type Kurosol. Kurosols are soils that have a strong texture contrast between the topsoil and subsoil horizons with strongly acidic subsoils and have moderate to moderately low inherent fertility. The alternative disturbance area has been digitally mapped by the Office of Environment and Heritage (OEH) as Land and Soil Capability (LSC) Class 5. LSC Class 5 is moderately low capability land with high limitations for high-impact agricultural land uses and is largely restricted to grazing, orchards, forestry and nature conservation.

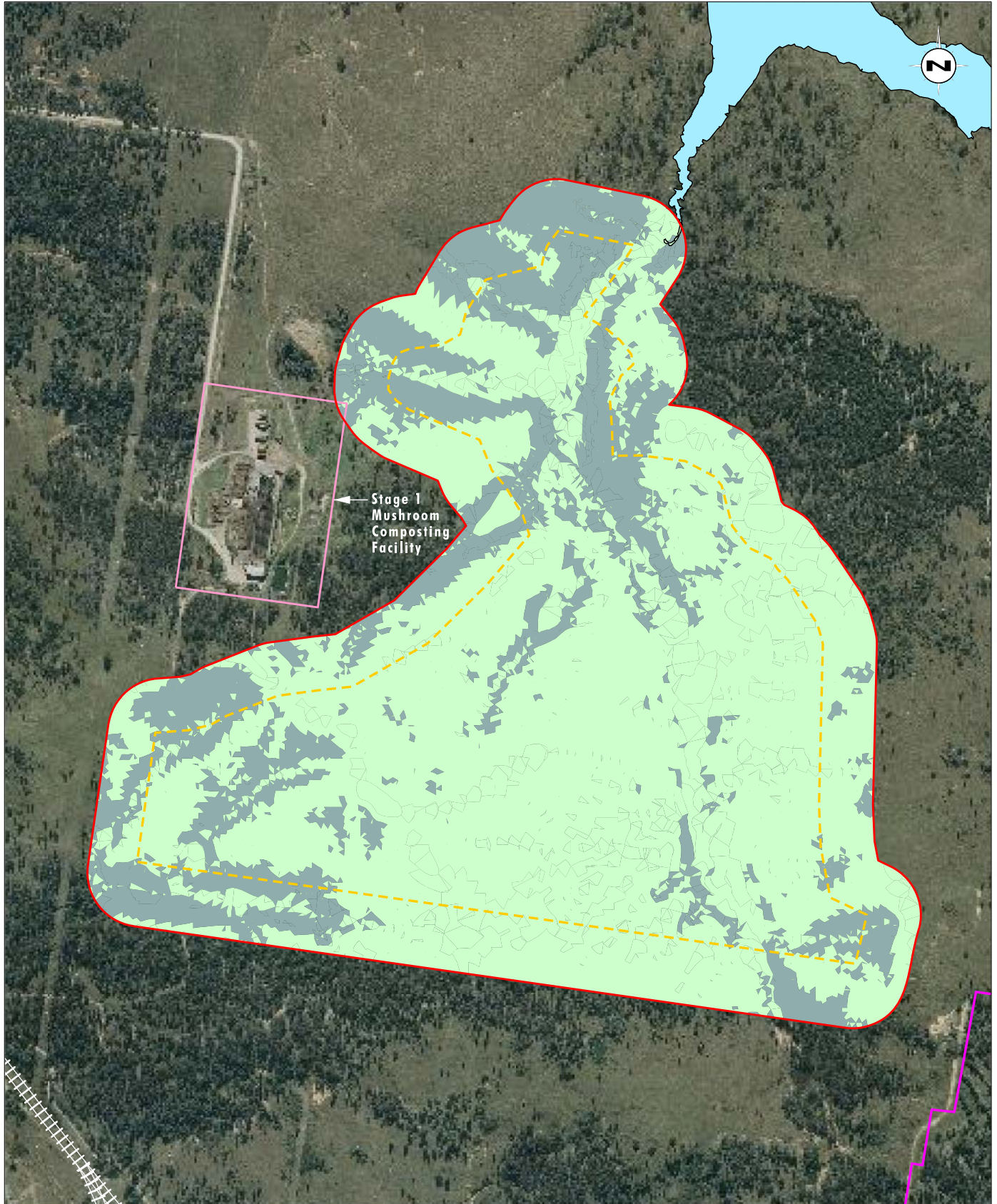


Image Source: AAM Hatch Pty Limited (March 2012), BCM (2013)
 Data Source: BCM (2013), SLR (2016)

0 100 250 500m
 1:10 000

Legend

- Revised Project Area
- Additional Disturbance Area
- Approved Northern Dam
- Stage 1 Mushroom Composting Facility
- 100m Study Area Buffer

- Slope:
- ≤ 10%
 - > 10%

FIGURE 6.4
Slope Analysis

6.5.1 Assessment Methodology

The site verification and methodology for the BSAL assessment was undertaken in accordance with the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (Interim Protocol) ((Office of Environment & Heritage (OEH) and Department of Primary Industries - Office of Agricultural Sustainability and Food Security (DPI-OASFS), 2013)). The Interim Protocol outlines the process for seeking verification of whether or not land mapped as BSAL meets the Interim Protocol's BSAL criteria.

The BSAL assessment undertaken for the proposed modification followed the process outlined in the Interim Protocol over the 160 hectare BSAL study area. This included a field soil survey at a scale of 1:25,000, where appropriate. For soil to be classified as BSAL it must follow the criteria outlined in the flow chart shown in **Figure 6.5**. If any criteria is not met (except step 5 or step 6), the site is not BSAL and there is no need to continue the assessment. The design of the soil survey was developed following a process of applying the BSAL methodology as a desktop exercise to identify any areas that would obviously not meet the criteria (termed exclusion zones). The field survey program was then developed to ensure that areas of relatively higher likelihood of meeting BSAL criteria were targeted for field analysis. To satisfy the Interim Protocol requirements, the field soil survey program was comprised of 10 observations which consisted of 7 detailed sites and 3 check sites

Exclusion Zones

Initially, land greater than 10% slope (**Figure 6.5**) within the BSAL study area was identified using topographical data from LIDAR data. Areas with slopes greater than 10% were excluded. In total 41 hectares was determined not to meet the BSAL methodology Criteria 1.

Subsequently, any land that did not meet the minimum 20 hectares of contiguous area to be classified as BSAL was also excluded (4 hectares). In total 45 hectares was determined not to meet the BSAL methodology Criteria 1 within the BSAL Study Area (**Figure 6.6**). Land contiguous to the BSAL study area was taken into consideration when classifying areas of land to be less than 20 hectares.

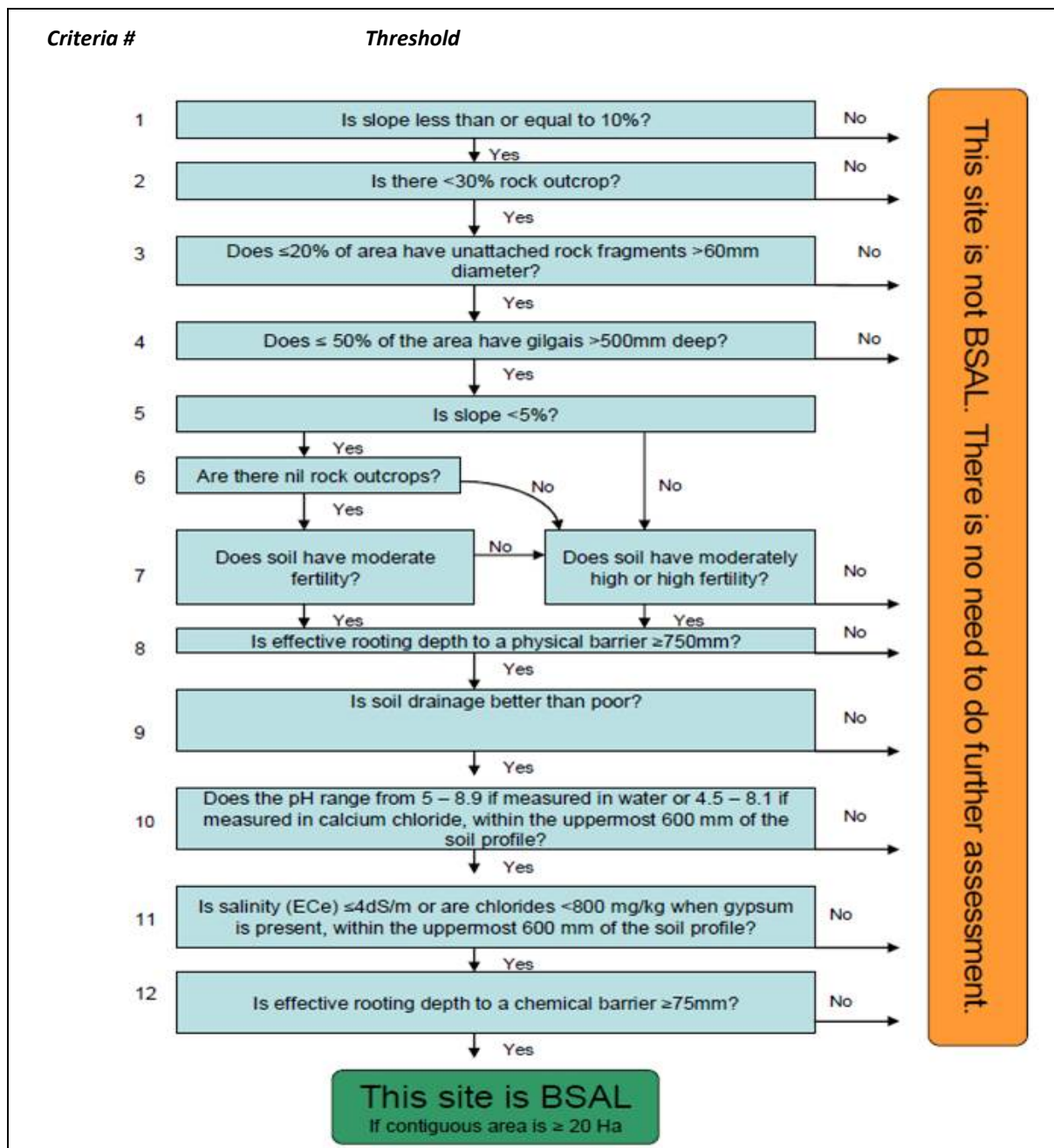


Figure 6.5

BSAL Assessment Criteria

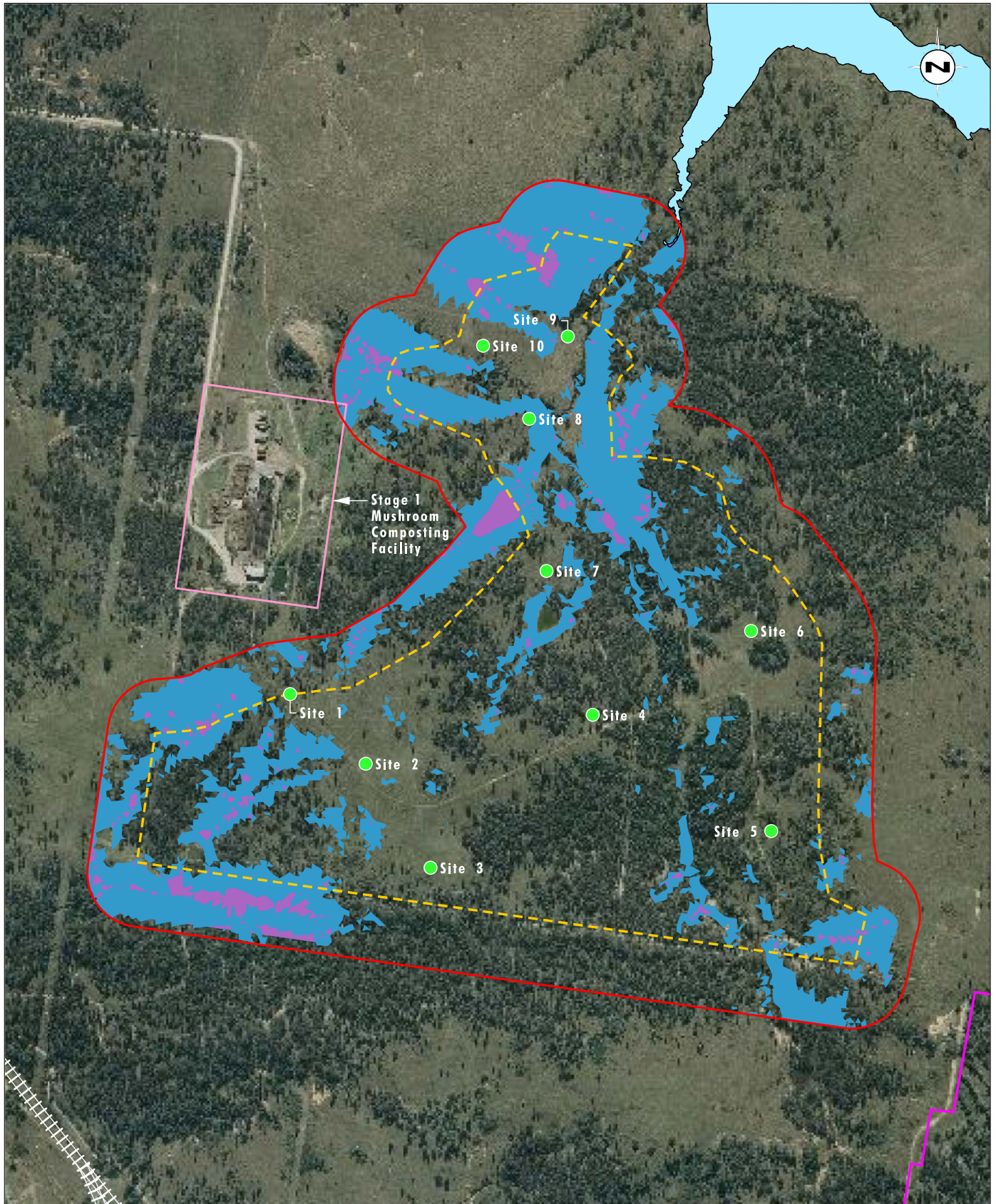


Image Source: AAM Hatch Pty Limited (March 2012), BCM (2013)
 Data Source: BCM (2013), SLR (2016)

0 100 250 500m
 1:10 000

Legend

- ▭ Revised Project Area
- ▬ Additional Disturbance Area
- ▭ Approved Northern Dam
- ▭ Stage 1 Mushroom Composting Facility
- ▭ 100m Study Area Buffer
- Soil Sampling Location
- ▭ Slope Exclusion Area
- ▭ Contiguous Area Exclusion (<20ha)

FIGURE 6.6
 Exclusion Areas

6.5.2 Soil Assessment

Within the BSAL study area two Soil Units were identified based on the dominant soil type, a Chromosol and a Sodosol, as indicated in **Table 6.11**.

Table 6.11 Soils Assessment Summary

Soil Unit	Soil Type	Area
1 Chromosol	Dominant: Red Chromosol	21 Hectares
	Sub-Dominant: Brown Chromosol	
2 Sodosol	Dominant: Brown Sodosol	94 Hectares
	Sub-Dominant: Red Sodosol	

6.5.3 BSAL Assessment

Neither of the Soil Units identified and mapped within the BSAL study area are BSAL due their failure of Criteria 7 (fertility), 8 (rooting depth physical barrier) and 9 (poor drainage). There is 115 hectares of land verified as non-BSAL within the BSAL study area based on the soil survey results. 45 hectares was excluded as BSAL due to greater than 10% slope or being a contiguous area less than 20 hectares.

Therefore, the total BSAL Study Area has been determined as non-BSAL.

The other key considerations for soil management relate to erosion and sediment control, which will be completed in accordance with the approved erosion and sediment control plan, and appropriate recovery and management of topsoil for use in rehabilitation. BCM has existing processes in place for management of both erosion and sediment control and appropriate management of topsoil which will be implemented for works associated with the proposed modification.

6.6 Ecology

An extensive process of design refinements were made so that the proposed EEA modified footprint would result in no net change in ecological impacts. An iterative design and review process was undertaken so that similar ecological values were proposed to be impacted as a result of the revised EEA footprint compared to those known to be impacted as a result of the currently approved EEA footprint.

The focus of the ecological assessment was the alternative disturbance area as all other proposed works will be undertaken within the approved disturbance area for the Bulga Surface Operation. As discussed in **Section 1.1**, the area in which the revised EEA is proposed to be located was assessed as part of the BOP EIS. BCM also has many years of ongoing flora and fauna monitoring data and data from previous assessments that informed this ecological assessment.

6.6.1 Methodology

6.6.1.1 Literature and Database Review

There is an extensive history of ecological survey and assessment at the BCC associated with the ongoing mining that has occurred at the site for over 30 years. This includes the detailed ecological surveys that were undertaken for the BOP EIS which included survey of the alternative disturbance area.

In addition to reviewing the results of the BOP EIS ecological assessment, a review of previous ecological studies and reports relevant to the proposed modification was undertaken. This included regional and sub-regional vegetation mapping reports, site-specific monitoring surveys, ecological surveys undertaken in the vicinity of the proposed modification and also relevant ecological database searches. The information obtained was used to inform survey design, and was also used to assist in the assessment of potentially occurring threatened and migratory species, endangered populations (EPs) and Threatened Ecological Communities (TECs). Relevant documents included:

- Ecological Impact Assessment for the Bulga Optimisation Project (Umwelt 2013)
- Response to Submissions and Revised and Amended Project Application Assessment Report (Umwelt 2013b)
- Upper Hunter Strategic Assessment for the Bulga Study Area (Umwelt 2015).
- Hunter Remnant Vegetation Project (Peake 2006)
- Greater Hunter Native Vegetation Mapping (Sivertsen *et al.* 2011)
- VIS Classification Database (OEH 2016), accessed April 2016
- OEH Threatened Species Website for known/predicted TECs in the Hunter subregion, accessed April 2016
- DoE Protected Matters Search Tool for known/predicted EPBC Act-listed TECs, accessed April 2016.

6.6.1.2 Native Vegetation and Threatened Flora Surveys

Extensive ecological surveys were undertaken in the alternative disturbance area as part of the BOP EIS between 2009 and 2013. The flora field survey undertaken for the BOP EIS was carried out in summer 2009, autumn, winter and spring 2011, autumn 2012 and autumn 2013. Survey methods used across the total study area (of which the alternative disturbance area formed part) included:

- Forty-four semi-quantitative vegetation sampling of 0.04 hectare plots
- Eleven rapid assessment points
- up to 90 kilometres of meandering transects comprising non-quantitative sampling through vegetation units
- field reconnaissance comprising the identification of spatial arrangement of the vegetation across the BOP Project area.

Since the completion of the BOP EIS, the NSW government has introduced new ecological survey and assessment guidelines; the Framework for Biodiversity Assessment (FBA) (OEH 2014), which requires the completion of biometric surveys in accordance with the BioBanking Assessment Methodology (BBAM). As no biometric transect information was collected as part of the BOP EIS surveys within the alternative disturbance area, supplementary surveys specific to the proposed modification were undertaken in accordance with FBA on 27 and 28 January 2016 within the alternative disturbance area. These included:

- 13 Biometric plots/transects
- targeted threatened flora species searches.

A total of 13 systematic plots/transect surveys were conducted to ground-truth the previous vegetation mapping of the alternative disturbance area (refer to **Table 6.12** and **Figure 6.7**). At each Biometric plot/transect, data was recorded in accordance with the FBA. This involved setting out 20 x 50 metre and 20 x 20 metre plots and a 50 metre transect. The location of each quadrat was recorded using a hand-held GPS with accuracy of ± 5 metres. The Map Grid of Australia (MGA) coordinate system was used.

At each plot/transect, roughly 45 to 60 minutes was spent searching for all vascular flora species present. Searches of each plot were generally undertaken via parallel transects from one side of the plot to another. Most effort was spent on examining the groundcover, which usually supported well over half of the species present, however the composition of the shrub, mid-storey, canopy and emergent layers were also thoroughly examined.

At each plot, 10 points along a 50 metre transect were assessed for:

- percentage native overstorey cover
- percentage native mid-storey cover.

In addition, 50 points along a 50 metre transect were assessed for:

- percentage native groundcover (grass)
- percentage native groundcover (shrubs)
- percentage native ground cover (other)
- percentage exotic plant cover.

Additional details were also recorded in each plot, including soil texture, drainage and depth; site disturbances; physiography (position in the landscape); and vegetation structure (strata percentage covers, heights and dominant species). Photographic records were also taken at each site.

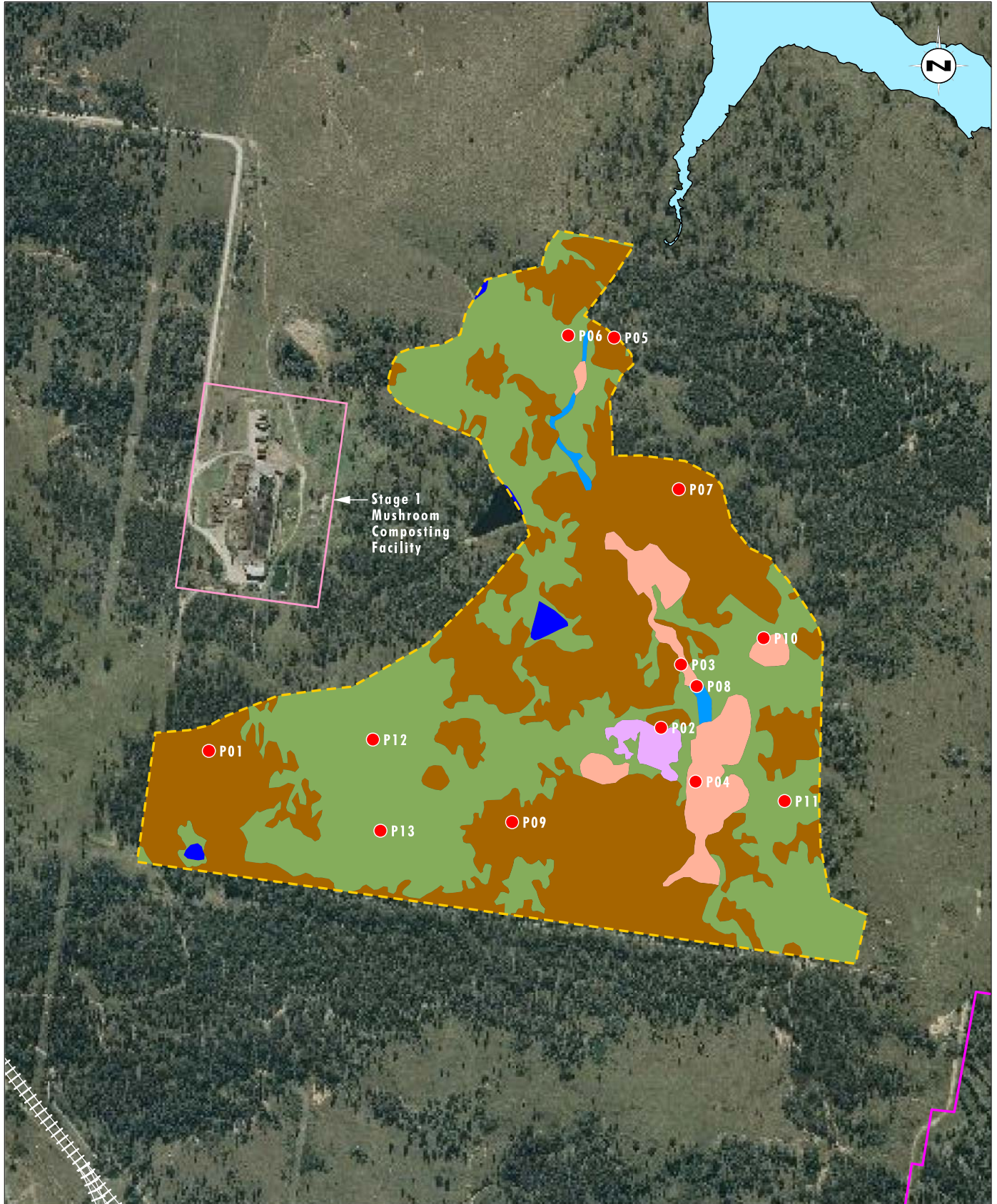


Image Source: AAM Hatch Pty Limited (March 2012), BCM (2013)
 Data Source: BCM (2013)

0 100 250 500m
 1:10 000

Legend

- Revised Project Area
- Additional Disturbance Area
- Approved Northern Dam
- Stage 1 Mushroom Composting Facility
- Plot/Transect Location
- Central Hunter Bullock Forest Regeneration
- Central Hunter Grey Box - Ironbark Derived Native Grassland
- Central Hunter Grey Box - Ironbark Woodland
- Central Hunter Swamp Oak Forest
- Riparian Derived Grassland
- Water Body

FIGURE 6.7

Vegetation Communities within the Additional Disturbance Area

Table 6.12 Adequacy of Biometric Vegetation Survey in the Modification Disturbance Area

Vegetation Zone	BVT and Condition Class	Area in the Proposed Modification Area (ha)	No. Plots/ Transects Undertaken	No. Plots/ Transects Required (FBA 2014)
1	HU905 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (Moderate to Good)	42.4	4	4
2	HU905 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (Moderate to Good_DNG)	39.9	4	4
3	HU906 Bull Oak grassy woodland of the central Hunter Valley (Moderate to Good)	0.9	1	1
4	HU945 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley (Moderate to Good)	4.8	3	3
5	HU945 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley (Moderate to Good_Other)	0.4	1	1
NA	Waterbody	0.4	-	-
Total		88.9	13	13

All vascular plants recorded or collected within quadrats and on meandering transects were identified using keys and nomenclature in Harden (1992, 1993, 2000 and 2002). Where known, changes to nomenclature and classification have been incorporated into the results. Updated taxonomy has been derived from the PlantNET (Royal Botanic Gardens 2016), an Australian Government sponsored database which provides a list of currently accepted names for Australian vascular flora. Common names used follow Harden (1992, 1993, 2000 and 2002) where available, and draw on other sources such as local names where these references do not provide a common name.

Threatened Flora Species Surveys

Extensive dedicated transects were walked across much of the BOP Project Area, which included the alternative disturbance area, as part of the Ecological Impact Assessment (Umwelt 2013) to search for threatened flora species over the following survey periods:

- December 2009
- March, May, June, July and October 2011
- April 2012
- March 2013

Searches for threatened species were undertaken in suitable habitat along numerous walking meandering transects and within the plot and transect surveys. In total, approximately 90 kilometres of walking was undertaken by two ecologists, in areas considered most likely to support potentially occurring threatened flora species. Throughout the supplementary biometric surveys of the alternative disturbance area in January 2016, targeted searches were carried out for threatened flora species that are known to occur in the local area or were considered likely to occur based on the species' known distribution and the presence of suitable habitat.

6.6.1.3 Threatened Fauna Species Surveys

Extensive fauna surveys including hair funnel sampling, spotlighting, call playback, Anabat echolocation call detection and analysis, reptile searches, amphibian searches, bird searches, and analysis of scats, scratches, tracks and characteristic calls were undertaken as part of the BOP Ecological Impact Assessment (Umwelt 2013) to identify threatened fauna species over the following survey periods:

- December 2009
- April, May and August 2011
- August 2012.

Furthermore, targeted species-specific surveys including bird searches, targeted green and golden bell frog surveys, spotlighting and Spot Assessment Technique (SAT) surveys, remote camera surveys and Anabat echolocation call detection and analysis was undertaken in the vicinity of the alternative disturbance area as part of the Upper Hunter Strategic Assessment (Umwelt 2015) in:

- September 2013
- March, April and May 2014.

In addition, biometric data relating to threatened fauna species habitat was collected within the alternative disturbance area as part of the plot/transect surveys described in **Table 6.12** above.

6.6.2 Results

6.6.2.1 Biometric Vegetation Types and Vegetation Zones

The surveys described above identified four Biometric Vegetation Types (BVTs) and five condition classes (refer to **Figure 6.7**) within the alternative disturbance area. **Table 6.13** identifies each of the vegetation communities that were mapped and described in the BOP Ecological Assessment (Umwelt 2013) and the corresponding biometric vegetation type (BVT) assigned to that community based on the outcomes of the January 2016 surveys of the alternative disturbance area. The biometric surveys undertaken in January 2016 confirmed the original mapping as described in Umwelt (2013).

Table 6.13 Vegetation Community Classification for the Alternative Disturbance Area

Original Mapping Unit (Umwelt 2013)	Corresponding Biometric Vegetation Type (BVT)	Area (ha)
Central Hunter Grey Box - Ironbark Woodland	HU905 - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter Moderate to Good Condition	40.6
Central Hunter Grey Box - Ironbark Derived Native Grassland	HU905 - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter Derived Native Grassland (DNG) Condition	39.5
Central Hunter Bulloak Forest Regeneration	HU906 - Bull Oak grassy woodland of the central Hunter Valley Moderate to Good Condition	0.9
Central Hunter Swamp Oak Forest	HU945 - Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley Moderate to Good Condition	4.8
Riparian Derived Grassland	HU945 - Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley Moderate to Good Riparian Condition	0.4

Note: HU### = Hunter/Central Rivers CMA Biometric Vegetation Type Number

Detailed descriptions of the floristic and structural characteristics of each of the BVTs identified in **Table 6.13** above can be found in Section 4.3.1 of the BOP Ecological Impact Assessment (Umwelt 2013).

6.6.2.2 Threatened Species and Communities

A range of threatened species and communities were recorded and assessed in the BOP Ecological Impact Assessment (Umwelt 2013). Supplementary surveys of the alternative disturbance area did not record any new or newly listed threatened species or communities listed under the TSC or EPBC Acts.

The following threatened species have previously been recorded within or near the alternative disturbance area:

- slaty red gum (*Eucalyptus glaucina*), vulnerable under the TSC and EPBC Acts
- grey-crowned babbler (eastern subspecies) (*Pomatostomus temporalis* subsp. *temporalis*), vulnerable under the TSC Act
- speckled warbler (*Chthonicola sagittata*), vulnerable under the TSC Act
- little lorikeet (*Glossopsitta pusilla*), vulnerable under the TSC Act

- hooded robin (south-eastern form) (*Melanodryas cucullata* subsp. *cucullata*), vulnerable under the TSC Act
- southern myotis (syn. large-footed myotis) (*Myotis macropus*), vulnerable under the TSC Act, and
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*), vulnerable under the TSC Act.

One Threatened Ecological Community (TEC), listed under the TSC Act and EPBC Act, has been recorded in the alternative disturbance area (refer to **Figure 6.7**) being:

- Central Hunter Grey Box - Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions Endangered Ecological Community (TSC Act - EEC)/ Central Hunter Valley Eucalypt Forests and Woodlands (EPBC Act - CEEC).

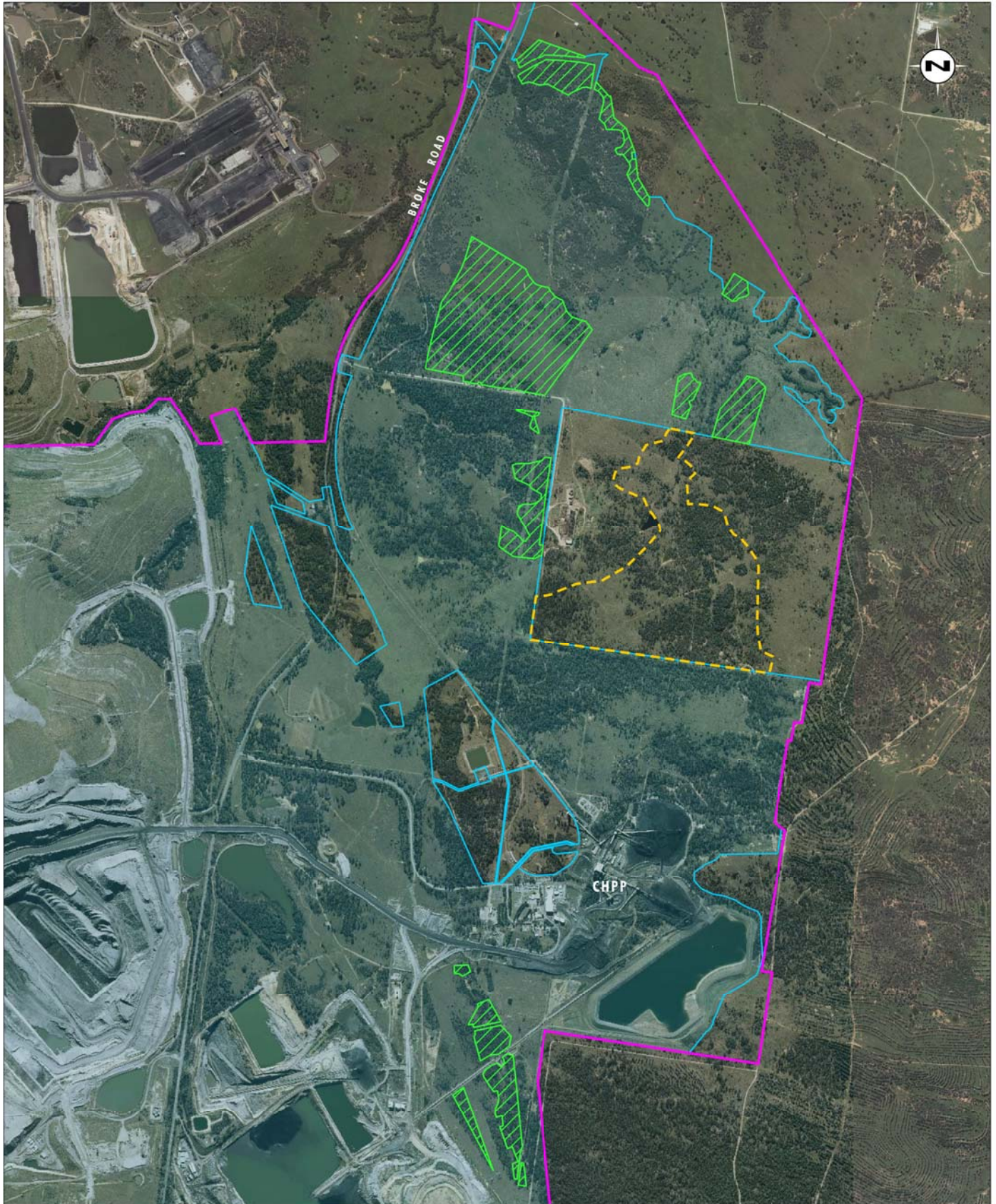
Analysis of consistency with the scientific determinations for the TECs was undertaken, with consideration of the advice provided by the relevant NSW Scientific Committee and the Commonwealth Threatened Species Scientific Committee guidelines for interpreting listings for species, populations and ecological communities under the TSC Act and EPBC Act respectively. A total of 40.6 hectares of EEC/CEEC was recorded in the alternative disturbance area.

6.6.3 Impact Assessment

The proposed modification effectively moves the current location of the approved EEA and accordingly the northern portion of the approved EEA will no longer be required to be disturbed should the proposed modification be approved. This was recognised early in the planning process by BCM, with the planning process for the proposed modification seeking to achieve a no-net change in native vegetation disturbance outcome. In addition to the area no longer required for the EEA, BCM therefore identified a number of areas within the currently approved disturbance area that have the potential to be removed from the approved disturbance area as part of the modification. These areas are identified in **Table 6.14** and shown on **Figure 6.8**. The area includes 90 hectares of native woodland and grassland vegetation originally planned to be disturbed by the approved EEA, north of the alternative disturbance area. While these areas will not be impacted, approximately 86.5 hectares of other native woodland and grassland vegetation will now be impacted as part of the proposed modification.

Table 6.14 below outlines the avoidance of impacts from within the currently approved disturbance area (area to be relinquished) in comparison to the area that will be impacted by the proposed modification. As indicated in the table, with the proposed modification there will be:

- a reduction in the total area of native vegetation disturbance (gain of 4.36 hectares)
- a reduction in the area of TEC impacts (gain of 7.83 hectares)
- an increase (4.28 hectares) in the area of Central Hunter Swamp Oak Forest impacted, however, this is offset by the gain in higher value TEC vegetation
- a slight reduction in the area of woodland vegetation to be cleared (gain of 3.77 hectares).



Data Source: AAM Pty Limited (March 2012), BCM (2013)

0 0.5 1.0 1.5 km
1:30 000

Legend

- ▭ Revised Project Area
- ▭ Approved Project Disturbance Footprint
- ▭ Additional Disturbance Area
- ▭ Areas no longer to be Disturbed

FIGURE 6.8

Approved Disturbance Area

Table 6.14 Area of each Vegetation Community to be impacted by the Proposed Modification and the corresponding area that will be relinquished

Vegetation Community	Area to be Impacted by proposed EEA (ha)	Area to be Relinquished (ha)	Residual Impact (ha)
Central Hunter Bulloak Forest Regeneration	0.88	1.10	-0.22
Central Hunter Grey Box - Ironbark Derived Native Grassland	39.50	40.85	-1.35
Central Hunter Grey Box - Ironbark Woodland	40.60	48.43	-7.83
Central Hunter Swamp Oak Forest	4.77	0.49	4.28
Riparian Derived Grassland	0.44	0.0	0.26
Water body	0.43	0.11	0.20
Total	86.62	90.98	Gain 4.36 ha

6.6.3.1 Threatened Species within the Alternative Disturbance Area

Ecosystem-credit Species

Table 6.15 outlines the ecosystem-credit species predicted or known to occur in the alternative disturbance area by the BioBanking Calculator, threatened species surveys and previous records.

The following ecosystem-credit species have been previously recorded in and around the BCC, but were not predicted to occur by the BioBanking Credit Calculator (BBCC):

- diamond firetail (*Stagonopleura guttata*), vulnerable under the TSC Act
- grey-headed flying-fox (*Pteropus poliocephalus*), vulnerable under the TSC and EPBC Acts
- large-eared pied bat (*Chalinolobus dwyeri*), vulnerable under the TSC and EPBC Acts
- little bentwing-bat (*Miniopterus australis*), vulnerable under the TSC Act
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*), vulnerable under the TSC Act
- southern myotis (syn. large-footed myotis) (*Myotis macropus*), vulnerable under the TSC Act
- eastern cave bat (*Vespadelus trouhtoni*), vulnerable under the TSC Act.

These species are also included in **Table 6.15** below and have been assessed in regard to the proposed modification.

The outcomes of the threatened species assessment conducted as part of the BOP Ecological Impact Assessment (Umwelt 2013), which previously assessed the impacts on the alternative disturbance area, were reviewed to determine whether the proposed modification would alter these outcomes. None of the threatened species listed in **Table 6.15** were assessed as likely to be significantly impacted by the BOP Ecological Impact Assessment (Umwelt 2013), with the exception of the brown treecreeper (*Climacteris picumnus* subsp. *victoriae*) which was not recorded in the alternative disturbance area. As the area of woodland habitat to be affected as a result of the proposed modification is reduced from that considered in the original assessment, a significant impact as a result of the proposed modification is not likely on any listed species or community.

An assessment of the likelihood of a significant impact on those threatened ecosystem-credit species that are predicted to occur by the BBCC, in accordance with the FBA is included in **Table 6.16** below. As detailed above, the overall area of impact will be slightly reduced in comparison with the approved Bulga Surface Operations (refer to **Table 6.14** above) due to the relinquishment of woodland/forest and derived native grassland habitats that were previously approved for disturbance.

Table 6.15 Ecosystem-credit Species Predicted and Occurring within the Alternative Disturbance Area

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
<p>barking owl <i>Ninox connivens</i></p>	V	-	Yes	<p>The alternative disturbance area provides suitable habitat for the barking owl, however it has not been recorded in the BCC. This species has been recorded in the local area and may forage in the alternative disturbance area.</p>	<p>No suitable breeding habitat</p> <p>Potential foraging habitat as part of a larger home range</p> <p>No significant impact</p>	No
<p>black-chinned honeyeater (eastern subspecies) <i>Melithreptus gularis</i> subsp. <i>gularis</i></p>	V	-	Yes	<p>The alternative disturbance area provides suitable habitat for the black-chinned honeyeater, however it has not been recorded in the BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.</p>	<p>Potential foraging and breeding habitat</p> <p>Significant impact not likely as the species does not depend exclusively upon the BOP Project Area for breeding or foraging, given suitable habitat exists elsewhere in the locality</p>	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
<p>brown treecreeper (eastern subspecies)</p> <p><i>Climacteris picumnus</i> subsp. <i>victoriae</i></p>	V	-	Yes	The brown treecreeper has been recorded within the woodland remnant to the west of Broke Road and on the southern boundary of the BCC. The species was recorded during the 2004, 2005, 2006, 2007, 2009 and 2011 annual monitoring surveys of the BCC.	<p>Potential significant impact</p> <p>Dispersal pathways of the population and the location of other populations in the landscape are not well known.</p>	No. This species has not been recorded in the alternative disturbance area and no significant impact is predicted.
<p>bush stone-curlew</p> <p><i>Burhinus grallarius</i></p>	V	-	No	The bush stone-curlew has not been recorded within or around the BCC or the alternative disturbance area. Targeted call playback surveys for the BOP Project failed to locate this species. The nearest record occurs approximately 45 kilometres from the alternative disturbance area near Paterson recorded in 1952 (OEH 2016).	Not considered likely to occur. No significant impact predicted.	No
<p>Diamond firetail</p> <p><i>Stagonopleura guttata</i></p>	V	-	Yes	The diamond firetail has been recorded in BCC in the 2003, 2008 and 2009 annual monitoring surveys. This species has been recorded in the local area and may forage in the alternative disturbance area.	<p>Potential foraging and breeding habitat</p> <p>No significant impact</p>	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
eastern false pipistrelle <i>Falsistrellus tasmaniensis</i>	V	-	Yes	The eastern false pipistrelle has been recorded once in the BCC during the 2010 annual monitoring survey. This species has been recorded in the local area and may forage in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
east coast freetail-bat (syn. eastern freetail-bat) <i>Mormopterus norfolkensis</i>	V	-	Yes	The east coast freetail-bat has been recorded regularly during annual monitoring surveys from 2008 to 2011. This species has been recorded in the local area and may forage in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
Eastern bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	V	-	Yes	The eastern bentwing-bat has been recorded in the BCC during annual monitoring surveys. The alternative disturbance area is considered to provide potential foraging habitat.	Potential foraging habitat No Significant impact	No
Eastern cave bat <i>Vespadelus troughtoni</i>	V	-	Yes	The eastern cave bat was recorded during the 2008 and 2009 annual monitoring and during surveys undertaken in 2011. The alternative disturbance area may provide foraging habitat.	Potential foraging habitat No Significant impact	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
eastern grass owl <i>Tyto longimembris</i>	V	-	Yes	The eastern grass owl has not been recorded in the BCC, alternative disturbance area or the locality. A record of the species is known to occur approximately 30km to the northwest of the alternative disturbance area in the central Hunter Valley.	Not assessed as part of BOP as the species is not considered likely to occur	No
flame robin <i>Petroica phoenicea</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the flame robin, however it has not been recorded in the BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
gang-gang cockatoo <i>Callocephalon fimbriatum</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the gang-gang cockatoo, however it has not been recorded in the BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
glossy black-cockatoo <i>Calyptorhynchus lathami</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the glossy black-cockatoo, however it has not been recorded in BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
greater broad-nosed bat <i>Scoteanax rueppellii</i>	V	-	Yes	The greater broad-nosed bat has been recorded once within the BCC in 2009 field surveys. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
grey-crowned babbler (eastern subspecies) <i>Pomatostomus temporalis</i> subsp. <i>temporalis</i>	V	-	Yes	The grey-crowned babbler is a resident species of many of the woodland remnants within and immediately adjacent to BCC. Grey-crowned babbler nests (for roosting and/or nesting) of varying quality occur throughout the BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
Grey-headed flying fox <i>Pteropus poliocephalus</i>	V	V	Yes	The grey-headed flying fox has been recorded in the BCC during annual monitoring surveys and surveys. The alternative disturbance area is considered to have potential foraging and breeding habitat for this species.	Potential foraging and breeding habitat No significant impact	No
hooded robin (south-eastern form) <i>Melanodryas cucullata</i> subsp. <i>cucullata</i>	V	-	Yes	The hooded robin was recorded in the BCC during the 2006 and 2007 annual monitoring surveys. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
Large-eared pied bat <i>Chalinolobus dwyeri</i>	V	V	Yes	The large-eared pied bat has been recorded in the BCC during annual monitoring surveys. The alternative disturbance area provides potential foraging habitat for this species.	Potential foraging habitat No significant impact	No
Little bentwing-bat <i>Miniopterus australis</i>	V	-	Yes	The little bentwing-bat has been recorded in the BCC during the annual monitoring surveys in 2011. The alternative disturbance area provides potential foraging habitat for this species.	Potential foraging habitat No significant impact	No
little eagle <i>Hieraaetus morphnoides</i>	V	-	Yes	The little eagle was recorded during the 2003 and 2006 monitoring period in BCC but has not been specifically recorded in the alternative disturbance area. The species is likely a rare visitor to the BCC, occurring only during movements across the landscape. This species may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
little lorikeet <i>Glossopsitta pusilla</i>	V	-	Yes	The little lorikeet was recorded during April and August 2011 flying over or foraging high in eucalypt foliage. The species has not been specifically recorded in the alternative disturbance area. The little lorikeet is likely a seasonal visitor to the BCC, occurring during periods of flowering by mature eucalypt tree species. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
masked owl <i>Tyto novaehollandiae</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the masked owl, however it has not been recorded in BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging habitat No significant impact	No
painted honeyeater <i>Grantiella picta</i>	V	V	Yes	The alternative disturbance area provides suitable habitat for the painted honeyeater, however it has not been recorded in BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
powerful owl <i>Ninox strenua</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the powerful owl, however it has not been recorded in BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging habitat No significant impact	No
scarlet robin <i>Petroica boodang</i>	V	-	Yes	The scarlet robin was recorded during the April and May 2011 field surveys of the BCC and is likely a seasonal visitor to BCC, occurring during autumn and winter months.	Potential foraging and breeding habitat No significant impact	No
Southern myotis (syn. large-footed myotis) <i>Myotis macropus</i>	V	-	Yes	The southern myotis has been recorded in the BCC during annual monitoring surveys and during surveys in 2011. This species is considered to be a regular visitor for the area with the alternative disturbance area having potential foraging habitat.	Potential foraging and breeding habitat No significant impact	No
speckled warbler <i>Chthonicola sagittata</i>	V	-	Yes	The speckled warbler has been recorded regularly across BCC. The species was recorded during the April, May and August 2011 fauna surveys and during all annual monitoring surveys of the BCC from 2003 to 2011. This species may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
spotted harrier <i>Circus assimilis</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the spotted harrier, however it has not been recorded in the BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging habitat No significant impact	No
spotted-tailed quoll <i>Dasyurus maculatus</i>	V	E	Yes	The alternative disturbance area provides suitable habitat for the spotted-tailed quoll, however it has not been recorded in the BCC. This species has been recorded in the local area and may occur in the alternative disturbance area.	Potential foraging habitat as part of larger home range No significant impact	No
square-tailed kite <i>Lophoictinia isura</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the square-tailed kite, however it has not been recorded in the BCC. This species has been recorded in the wider local area and may occur in the alternative disturbance area.	Not assessed as part of BOP as the species is not considered likely to occur	No
swift parrot <i>Lathamus discolor</i>	E	E	Yes	The swift parrot was recorded during targeted winter bird surveys in 2012 in trees planted in the car park of the BCC site office. The swift parrot is likely a rare seasonal visitor to the BCC and has not been recorded within the alternative disturbance area. This species may occur in the alternative disturbance area.	Potential foraging habitat No significant impact	No

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
turquoise parrot <i>Neophema pulchella</i>	V	-	Yes	The alternative disturbance area provides suitable habitat for the turquoise parrot, however it has not been recorded in BCC. This species has been recorded in the wider local area and may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
varied sittella <i>Daphoenositta chrysoptera</i>	V	-	Yes	The varied sittella was recorded during the August 2011 fauna surveys and during the 2003, 2004, 2005, 2006, 2007, 2009 and 2011 annual monitoring surveys for the BCC. This species may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No
yellow-bellied sheath-tail-bat <i>Saccolaimus flaviventris</i>	V	-	Yes	The yellow-bellied sheath-tail-bat was recorded as a possible identification from an Anabat record during the May 2011 field survey and recorded during the 2010 annual monitoring survey of the BCC. This species may occur in the alternative disturbance area.	Potential foraging and breeding habitat No significant impact	No

Species-credit Species

Table 6.16 outlines the species-credit species that have been recorded or are known to occur in or around the alternative disturbance area based on previous surveys and records. No impacts outside that assessed as part of the BOP EIS are expected to result from the proposed modification for species-credit species.

The following species-credit species (for breeding/roosting habitat only) have been previously recorded in and around BCC, however no breeding or roosting habitat has been recorded within the alternative disturbance area and therefore the species-credit component of these species habitat are not relevant to the proposed modification.

- grey-headed flying-fox (*Pteropus poliocephalus*), vulnerable under the TSC and EPBC Acts
- large-eared pied bat (*Chalinolobus dwyeri*), vulnerable under the TSC and EPBC Acts
- little bentwing-bat (*Miniopterus australis*), vulnerable under the TSC Act
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*), vulnerable under the TSC Act
- southern myotis (syn. large-footed myotis) (*Myotis macropus*), vulnerable under the TSC Act, and
- eastern cave bat (*Vespadelus trougtoni*), vulnerable under the TSC Act.

Table 6.16 Species-credit Species Predicted and Occurring within or Surrounding the Development Footprint

Species	TSC Status	EPBC Status	On Site	Further Information	Outcome of BOP Section 5A Assessment (Umwelt 2013)	Any change to previous assessment outcomes?
slaty red gum <i>Eucalyptus glaucina</i>	V	V	Yes	Slaty red gum has been recorded in BCC and in the adjacent Singleton Military Training Area (SMTA). The size of the of slaty red gum population which extends onto the adjoining SMTA is estimated to be in the order of approximately one million individuals (ERM 2004) as well as large numbers of its hybrid with <i>Eucalyptus tereticornis</i> . No slaty red gum individuals have been recorded in the alternative disturbance area and no impacts are expected.	Approximately 15 slaty red gum (with additional hybrids) will be disturbed by the BOP project. No significant impact	No
regent honeyeater <i>Anthochaera phrygia</i>	CE	CE	Yes	A single regent honeyeater was recorded at the BCC site offices during August 2011 in non-endemic trees but has not been recorded in the habitats of the alternative disturbance area. The regent honeyeater is likely a rare seasonal visitor to BCC, occurring during periods of flowering by mature eucalypt tree species. No regent honeyeater individuals have been recorded in the alternative disturbance area and no further impacts are expected to result from the proposed modification.	No significant impact due to low level of usage of the BOP project area by the species.	No

6.6.3.2 Section 5A Assessment

Table 6.17 provides a threatened species assessment in accordance with Section 5A of the EP&A Act. The proposed modification will not result in an increase in the overall disturbance footprint of the Bulga Surface Operations and the modification will not result in a significant impact on threatened species, endangered populations or threatened ecological communities.

Table 6.17 Section 5A Assessment

Matters for Consideration	Comment
<p>In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.</p>	<p>The proposed modification is unlikely to have an adverse effect on the life cycle of threatened species such that a viable local population of the species is likely to be placed at risk of extinction.</p>
<p>In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.</p>	<p>The proposed modification is unlikely to have an adverse effect on the life cycle of a species that constitutes an endangered population such that a viable local population of the species is likely to be placed at risk of extinction.</p>
<p>In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction</p>	<p>The proposed modification is not likely to have an adverse effect on the extent of an ecological community such that its local occurrence is likely to be placed at risk of extinction.</p> <p>The proposed modification is not likely to substantially and adversely modify the composition of an ecological community such that its local occurrence is likely to be placed at risk of extinction.</p>
<p>In relation to the habitat of a threatened species, population or ecological community: the extent to which habitat is likely to be removed or modified as a result of the action proposed whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality</p>	<p>The proposed modification will not result in an area of habitat becoming fragmented or isolated from other areas of habitat that is in addition to that already approved.</p> <p>The proposed modification will not remove, modify, fragment or isolate habitat in addition to that already approved and will not negatively impact the long-term survival of threatened species, populations or ecological communities in the locality.</p>

Matters for Consideration	Comment
whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)	There is no listed critical habitat in the vicinity of the proposed modification. The proposed modification will not result in a direct or indirect impact on critical habitat.
whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan	Disturbance associated with the proposed modification will not contravene the objectives or actions of a recovery plan or threat abatement plan in addition to that already approved.
whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	The proposed modification will not exacerbate the operation of, or increase the impact of key threatening processes outside that already approved.

6.6.3.3 Impacts on Matters of National Environmental Significance

As discussed in **Section 5.1**, under the Commonwealth EPBC Act, the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on MNES.

BCC was granted approval under the Commonwealth EPBC Act on 9 May 2014 for the Bulga Coal Optimisation Project, Upper Hunter Valley, NSW (2012/6637) for impacts on MNES, in particular threatened and migratory species. The area referred for assessment wholly enclosed the alternative disturbance area.

Since approval was granted, Central Hunter Valley Eucalypt Forests and Woodlands Critically Endangered Ecological Community has been listed under the EPBC Act. This community has been recorded in the alternative disturbance area in the form of Central Hunter Grey Box - Ironbark Woodland. The detailed review of the concept design for the revised EEA focussed on achieving no net change to the total area of native vegetation disturbed as a result of the Bulga Surface Operations. This outcome was achieved and the area of native woodland vegetation will not change and will remain compliant with condition 1 of EPBC Approval 2012/6637. Therefore, further assessment of impacts on Commonwealth MNES is not required.

6.6.3.4 Impact Assessment Summary

As part of the conceptual planning process for the proposed modification, BCM has undertaken a detailed review of the concept design for the revised EEA with a focus on reducing the potential net increase in impact to native vegetation, in particular the Central Hunter Grey Box – Ironbark Woodland EEC and threatened fauna species habitat. The review process has ensured that the proposed modification will not result in a net increase in impact to woodland vegetation. BCM has determined that the currently approved disturbance area could be reduced by 89.91 hectares and will relinquish these areas as part of the proposed modification. Accordingly, there will be no net increase in impacts to biodiversity as a result of the proposed modification.

As outlined in **Table 6.14**, the proposed modification would reduce the impact to Central Hunter Grey Box - Ironbark Woodland EEC by 7.83 hectares. It is important to note that while the modification will increase the impact to the Central Hunter Swamp Oak Forest by 4.28 hectares, this community is not listed as threatened. Further, the fauna habitat characteristics provided by this community for the threatened fauna species that are predicted to occur are also provided by Central Hunter Grey Box - Ironbark Woodland community and therefore the impact on potential habitat for threatened fauna species does not increase as a result of the proposed modification.

The proposed modification is not expected to result in a significant impact on threatened flora and fauna species or TECs known or predicted to occur in the alternative disturbance area.

Noting the impact assessment above, it is considered that the current offset package approved as part of the Bulga Optimisation Project remains adequate and that no changes to the offsets are required as there is no net increase in the amount of woodland and forest threatened fauna species habitat or Central Hunter Grey Box - Ironbark Woodland EEC as a result of the proposed modification.

6.6.4 Impact Mitigation Strategy

BCM has implemented a comprehensive Biodiversity Management Plan to mitigate impacts on ecological values as part of the Bulga Surface Operations. All works associated with the proposed modification will be undertaken in accordance with the biodiversity Management Plan.

6.7 Visual Analysis

The visual impacts of the Bulga Surface Operations were addressed in Section 5.9 of the EIS and Section 4.9 of the preferred project report and included evaluation of:

- changing landforms and infrastructure on the site during the various stages of the Bulga Surface Operations
- potential visual impacts of the Bulga Surface Operations on private landowners in the surrounding area, as well as key vantage points in the public domain, including lighting impacts
- and a detailed description of the measures which would be implemented to minimise the visual impacts of the Bulga Surface Operations, and in particular the design and landscaping of the proposed Noise and Visual Bund.

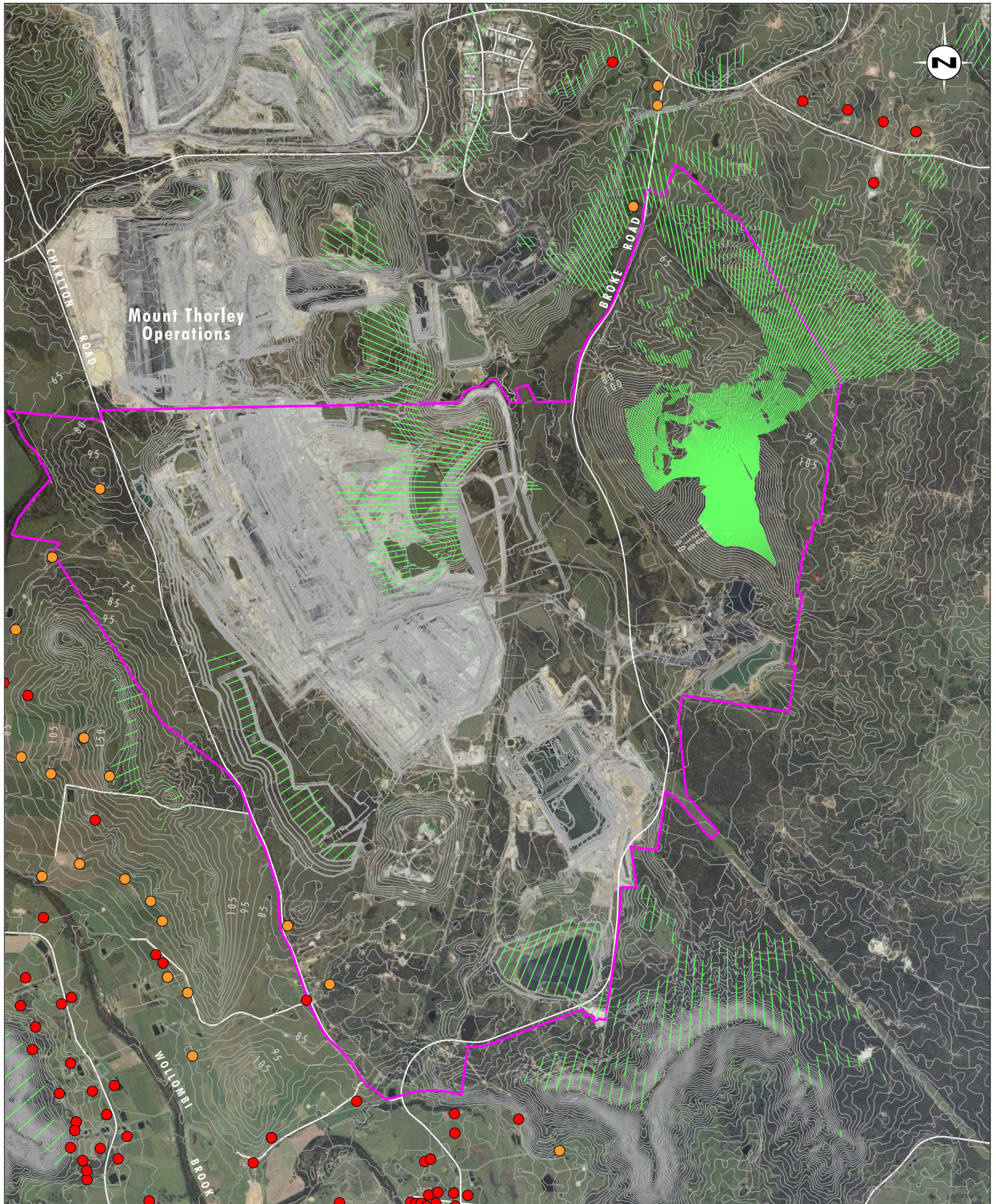
As discussed in the EIS, the visual impacts of the approved Bulga Surface Operations will be mitigated through the screening effect of the revegetated Noise and Visual Bund, which will prevent views of the ongoing surface mining operations from most locations. Once the Noise and Visual Bund is constructed and revegetation has commenced, the visual impacts of the ongoing mining operations will be less than the impacts from the previous operations.

The BOP EIS visual impact assessment found that views of the EEA would be limited to vehicles on Broke Road, with the EEA not expected to be visible from the nearest residences to the northeast on Mitchell Line of Road due to intervening topography and vegetation.

The EIS and preferred project report visual assessment included radial analyses and photo montages. As part of the proposed modification, a radial analysis has been undertaken specifically for Mitchell Line of Road to assess whether there would be any observable difference due to the revised EEA.

6.7.1 Visual Impacts

Figure 6.9 presents the radial analysis taken from the top of the revised EEA. Whilst the radial analysis (which is developed from a digital terrain model of the land and does not take into account vegetation on the land) would indicate that parts of the revised EEA may be visible at one privately owned residence to the northeast, consistent with the findings of the BOP EIS, the line-of-sight to the revised EEA is obscured by roadside vegetation and trees on a ridgeline between Mitchell Line of Road and the revised EEA, screening the potential views.



Source: AAM Pty Limited (March 2012), BCM (2013), EMGA

0 1 2 3 km
1:60 000

Legend

- ▭ Revised Project Area
- ▨ Visible Line of Site
- Visible Site Location
- Residences - Bulga Owned
- Residences - Mt Thorley Owned
- Residences - Private

FIGURE 6.9
Radial Analysis
Conceptual Contours

6.8 Social Impact Assessment

A comprehensive Social Impact and Opportunities Assessment was completed as part of the BOP EIS involving detailed engagement with the local community. BCM has continued to work with the community during the implementation of the Bulga Optimisation Project and has consulted the community in regard to the proposed modification as discussed in **Section 5.0**.

As outlined in the assessments provided above, the proposed modification can be undertaken without increasing the level of impact to the community. The revised EEA is located further away from the private residences on Mitchell Line of Road, the nearest private residences to the EEA, than the currently approved EEA. The proposed modification does not seek to increase the predication rates nor will it increase the size, volume or height of the EEA.

Further, the proposed changes will not result in any changes to the mine or construction workforce numbers and will not generate any population change based social impacts in the local or regional context.

The revised EEA would reduce the need for the construction of a haul bridge across the across the road to the Stage 1 Mushroom Composting Facility thus reducing the direct interaction between the mine and the Stage 1 Mushroom Composting Facility.

The Social Impact and Opportunities Assessment for the approved operations identified a range of mitigation and management measures to be implemented as part of the Bulga Optimisation Project including a Voluntary Planning Agreement. Due to the minor impacts associated with the proposed modification, the social impacts or opportunities associated with the existing operations will not change. On this basis, the mitigation and management measures currently in place remain appropriate.

7.0 Environmental and Social Mitigation and Management Measures

As outlined in **Section 5.0**, all of the proposed impacts are within relevant criteria (where applicable) and do not result in any changes to the affection zone for the Bulga Surface Operations. As discussed in **Section 6.6**, no changes are required to the currently approved biodiversity offset areas as there is no net change in biodiversity impacts.

As discussed in **Section 6.8**, BCM has also implemented a social impact mitigation strategy which remains appropriate for the Bulga Surface Operations with no changes identified as necessary as an outcome of this assessment.

BCM has prepared and implemented the environmental management and monitoring plans required by development consent SSD 4960 and the existing management plans and systems will be applied to the proposed modification. The relevant management plans will be updated in response to the proposed modification, if approved.

No changes are required to the existing monitoring program in response to the proposed modification.

8.0 Proposed Updates to Conditions of Consent

The determining authority will confirm the required changes to the existing condition of SSD 4960 should the proposed modification be approved, however, to inform the assessment of the proposed modification some proposed changes to the existing conditions are provided below. In particular, due to the arrangements that have been agreed with Mushroom Composters, some of the conditions are no longer required and BCM considers it is no longer necessary for them to remain as conditions of consent.

Schedule 2

Terms of Consent

Condition 2 of Schedule 2 will need to be updated to refer to this SEE.

Schedule 3

Removal of Condition 5

Condition 5 of schedule 3 relates specifically to the management of construction noise associated with the Broke Road realignment. The Broke Road realignment construction phase is now complete with the newly realigned Broke Road opened to traffic in February 2016. This condition is no longer applicable and BCM proposes that it should be deleted.

Modification of Condition 18

Given the Eastern Emplacement Area Management Framework (EEAMF) has been prepared to the satisfaction of the Secretary (as confirmed in the Secretary's letter of approval dated 13 May 2016) BCM considers it appropriate to replace Condition 18 (f) of Schedule 3 with "manage activities at the Eastern Emplacement Area in accordance with the approved EEAMF".

Removal of Conditions 19, 20 and 21

BCM established Technical Review Committee as required under Condition 20 of SSD 4960. The Technical Review committee consisted of representatives from:

- BCM
- The Mushroom Composters
- An independent air quality expert approved by the Secretary

The Technical Review Committee's functions are to oversee the management of air quality impacts on the Stage 1 Mushroom Composting Facility.

Condition 19 of SSD 4960 required BCM to prepare and implement an Eastern Emplacement Area Management Framework (EEAMF), in consultation with the Technical Review Committee. Condition 19 further detailed the specific requirements of the EEAMF and was to be prepared to the satisfaction of the Secretary. On 13 May 2016 the Secretary confirmed that the EEAMF had been prepared satisfactorily and was therefore approved. BCM now operates in accordance with the approved EEAMF.

The approved EEAMF now forms part of a formal negotiated agreement between BCM and Mushroom Composters, and BCM is legally committed to carrying out its obligations in accordance with the approved EEAMF. As a result, the arrangements regarding the Technical Review Committee have been incorporated into the negotiated agreement that has been executed by Mushroom Composters and BCM.

As the EEAMF has been finalised and approved by the Secretary, the requirements of Condition 19 of Schedule 3 have been fulfilled, and BCM therefore seeks removal of that conditions.

Similarly, as the Technical Review Committee has been established and the arrangements regarding its ongoing operation have been incorporated into the EEAMF and the negotiated agreement between Mushroom Composters and BCM, BCM considers that Conditions 20 of Schedule 3 is no longer necessary as a condition of consent and should therefore be removed..

Condition 21 of Schedule 3 identifies circumstances in which BCM may be required to acquire the Mushroom Composters land. As noted above, Mushroom Composters and BCM have entered into commercial arrangements regarding the acquisition by BCM of the land required for the revised EEA. A further outcome of the agreement that has been reached by Mushroom Composters and BCM is that the remainder of the Mushroom Composters land will not need to be acquired by BCM. Condition 21 was originally imposed for the benefit of the Mushroom Composters. However, the condition has now been superseded by the negotiated agreement and is no longer required. As such, it should be removed.

Set out in **Appendix 1** is a letter from Mushroom Composters in which they support the removal of Conditions 19, 20 and 21 of Schedule 3.

Removal of Condition 22(f)

In light of the commercial arrangements that have now been put in place, Mushroom Composters and BCM consider that Condition 22(f) of Schedule 3 is also no longer required and should be removed from the conditions of consent.

Amendment to Condition 41

Condition 41 identifies the required heritage management measures. As discussed in **Section 6.4**, the revised EEA would impact three additional archaeology sites that were not proposed to be impacted as a result of the approved Bulga Surface Operations. It is proposed that these three sites will be surface collected in accordance with the procedures outlined in the approved Archaeology and Cultural heritage Management Plan. Condition 41 will need to be updated to incorporate these three sites.

Appendices

Appendix 1

The schedule of lands will need to be update to reflect the area of land for the revised EEA.

Appendix 8

Appendix 8 should be removed as it relates to condition 19 of Schedule 3 which, as described above, has been fulfilled and for which BCM seeks removal.

Appendix 10

Appendix 10 will need to be updated to reflect the three additional archaeological sites that will be impacted.

General

Appendices 2, 3, 5, 9, 10, 11, and 13 will need to be updated to reflect the revised mine plans resulting from the proposed modification and the revised Project Area.

9.0 Justification and Conclusion

The proposed modification does not result in the Bulga Surface Operations being substantially different from the currently approved operations. The amendments to the EEA have generally resulted in environmental impacts that are the same or reduced when compared to those impacts currently approved. It is therefore the case that the development subject to Development Consent SSD 4960 will be substantially the same development should this application for modification be approved.

The assessments for the approved Bulga Surface Operations concluded that it would be reasonable to consider that with the implementation of the management, mitigation and offset measures proposed by BCM, the proposed mining operations would result in a substantial net benefit to the NSW community. These benefits were recognised by the NSW Planning and Assessment commission in its consideration and determination of the Project. The proposed modification will not change these benefits.

The proposed modification will provide BCM with significant operational benefits including the removal of the need for BCM to construct a haul road bridge across the Stage 1 Mushroom Composting Facility access road resulting in reduced costs and reduced potential for interaction with traffic from the Stage 1 Mushroom Composting Facility. Further, as outlined in this assessment, the impacts of the Bulga Surface Operations with the proposed modification are very similar to the currently approved operations and all potential impacts can be managed within the current approval limits. Accordingly the proposed modification will allow these benefits to be realised without resulting in any substantive change in impacts to the environment and community.

10.0 References

- Aboriginal Archaeological Values Assessment for the Bulga Optimisation Project (OzArk 2012)*
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW' (DEC 2005)
- Department of Environment and Climate Change (DECC), 2008. *Managing Urban Stormwater – Soils and Construction, Volume 2E – Mines and Quarries.*
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) 2012/6637*
- Framework for Biodiversity Assessment (FBA) (OEH 2014)*
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